



United States Department of Agriculture

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# Lower Joseph Creek Restoration Project

## Draft Environmental Impact Statement



Forest Service

Wallowa-Whitman  
National Forest

Wallowa Valley  
Ranger District

October 2014

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**Lower Joseph Creek Restoration Project  
Draft Environmental Impact Statement  
Wallowa County, Oregon**

**Lead Agency:** USDA Forest Service

**Cooperating Agency:** Wallowa County

**Responsible Official:** TOM MONTOYA, FOREST SUPERVISOR  
1550 Dewey Ave.  
Baker City, OR 97850

**For Information Contact:** AYN SHLISKY, TEAM LEAD  
72510 Coyote Rd.  
Pendleton, OR 97801  
541-278-3762

**Abstract:** This analysis addresses the impacts from implementing the Lower Joseph Creek Restoration Project (LJCRP). Action alternatives included the Modified Proposed Action, where thinning and mechanical fuel treatments across approximately 16,700 acres would encourage the development of landscape resilience, including large tree structure, understory plant diversity, forage productivity, characteristic fire and insect and pathogen disturbances, and provide income and opportunities for local communities to experience natural resource-dependent lifestyles. Thinning of largely younger trees across an additional 5,500 acres, which are in the process of recovery after stand replacement disturbance, would encourage the development of spatial heterogeneity and increase the proportion of early seral tree species toward a more resilient condition, consistent with historical reference conditions. Prescribed burning on up to 90,000 acres would reduce both natural fuel accumulations and those resulting from thinning, increase understory productivity and diversity, allow fire to perform its natural ecological role, and increase resilience to disturbance. The Modified Proposed Action and one additional alternative respond to issues related to the transportation system and vegetation treatments within designated old growth management areas, inventoried roadless areas, and Category 4 riparian habitat conservation areas.

**Send Comments to:** Ayn Shlisky  
Blue Mountains Restoration Team Lead  
72510 Coyote Rd.  
Pendleton, OR 97801

## Summary

The Lower Joseph Creek Restoration Project aims to achieve desired conditions as expressed by overarching agency plans and policies, tribes, cooperating governments, collaborative groups, and the public. The purpose of the Lower Joseph Creek Restoration Project (LJCRP) is to restore, maintain, and enhance forest and rangeland resiliency to natural disturbances, protect natural resources at risk to uncharacteristic wildfires and insect and disease outbreaks, contribute to local economic and social vitality, modify fire behavior potential, and improve future forest, range, and fire management opportunities. Internal and external scoping for opportunities, issues, and concerns revealed three significant issues requiring detailed analysis and resolution. Specifically, the LJCRP aims to resolve issues regarding: 1) the best network of roads that will allow for recreation, harvesting forest products, fire management, accessing private inholdings, administration, and other uses, while also reducing or eliminating the adverse impacts that roads may have on forest and riparian resources; 2) the best vegetation treatments to restore forest structure and composition toward the historic range of variation (HRV; particularly regarding the size and species of trees to retain or harvest), and 3) the types of forest management that is needed in designated old growth management areas (Management Area 15), inventoried roadless areas, and riparian habitat conservation areas to move toward HRV. This DEIS assesses the range of effects of three alternatives, the no action, and two alternative active approaches to achieve the project purpose, and resolve, to the degree possible, the three significant planning issues. The alternatives range in the extent of upland forest thinning from 0 to 22,100 acres, including 0 to 800 acres in old forest management allocations; 0 to 2,600 acres in riparian habitat conservation areas; and 0 to 5,500 acres in inventoried roadless areas. The alternatives range in the extent of burning from 0 to 90,000 acres (through both planned and unplanned fire), and in the length of the road network from 363 to 406 open and closed miles. The EIS also assesses the effects of restoration and related activities (connected actions) common to all action alternatives. This DEIS discloses the beneficial and adverse effects of alternative management approaches for the project area, as justification for the responsible official's preferred alternative. It also describes the assumptions we needed to make where adequate understanding was uncertain. To accomplish restoration goals, non-significant forest plan amendments are proposed.

Alternative 2 is the preferred alternative.

## Acronyms

AQI - Air Quality Index  
ATV – All Terrain Vehicle  
BA – Biological Assessment  
BE – Biological Evaluation  
BMP – Best Management Practice  
BO – Biological Opinion  
CEQ – Council on Environmental Quality  
CFR – Code of Federal Regulations  
CWPP - County Wildfire Protection Plan  
DSC – Detrimental Soil Conditions  
DBH – diameter breast height  
DCH – Designated Critical Habitat  
DecAID - Decayed Wood Advisor  
DEIS – Draft Environmental Impact Statement  
DOGMA – Dedicated Old Growth Management Area

DSC – Detrimental Soil Conditions  
EIS – Environmental Impact Statement  
ENSO - El Nino Southern Oscillation  
EPA – Environmental Protection Agency  
ERS – Eastside Restoration Strategy  
ESA – Endangered Species Act  
FEIS – Final Environmental Impact Statement  
FRCC – Fire Regime Condition Class  
FSH – Forest Service Handbook  
GHG – Green House Gas  
GIS – Geographic Information System  
HEI – Habitat Effectiveness Index  
HRV – Historic Range Of Variability  
ICBEMP –Interior Columbia Basin Ecosystem Management Project  
IPCC - Intergovernmental Panel on Climate Change  
IRA – Inventoried Roadless Area  
LJCRP – Lower Joseph Creek Restoration Project  
LOS - Late-Old Structural Stages  
LRMP – Land and Resources Management Plan  
LWD – Large Woody Debris  
MA – Management Area  
MCR -Middle Columbia River  
MIS – Management Indicator Species  
MVUM – Motor Vehicle Use Map  
NAAQS - National Ambient Air Quality Standards  
NEPA – National Environmental Policy Act  
NHPA - National Historic Preservation Act  
NFMA – National Forest Management Act  
NTMBS - Neotropical Migratory Bird Species  
NOI – Notice of Intent  
NFS – National Forest System  
OFMS - Old Forest Multi-Strata  
OFSS - Old Forest Single Strata  
OHV – Off-Highway Vehicle  
PCE - Primary Cavity Excavators  
PVG – Potential Vegetation Group  
PWA - Potential Wilderness Area  
RACR - Roadless Area Conservation Rule  
RHCA – Riparian Habitat Conservation Area  
RMO - Riparian Management Objectives  
RNA – Research Natural Area  
ROD – Record of Decision  
ROS – Recreational Opportunity Spectrum  
RV – Range of variability  
TES – Threatened and endangered species  
USDA – United States Department of Agriculture  
USFWS – US Fish and Wildlife Service  
WEPP -Water Erosion Prediction Project  
WUI -Wildland Urban Interface  
WWNF – Wallowa-Whitman National Forest

## How This Document is Organized

The format of this DEIS follows the Council on Environmental Quality (CEQ) recommended format (40 CFR 1502.10). The document is organized into five chapters:

### **Chapter 1 Purpose and Need for Action**

This chapter includes information about the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.

### **Chapter 2 Alternatives, including the Proposed Action**

This chapter provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on significant issues raised by the public, Tribes, the Forest Service and other agencies. Finally, this section provides summary comparison tables of the activities associated with each alternative, and how well the alternatives respond to the purpose and need.

### **Chapter 3 Affected Environment and Environmental Consequences**

This chapter describes the affected environment and the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area.

### **Chapter 4 Consultation and Coordination**

This chapter provides a list of preparers and agencies consulted during the development of this draft environmental impact statement (DEIS) and information regarding the distribution of this DEIS.

### **Chapter 5 Glossary, References, and Index**

Following Chapter 4 is a glossary of terms, a list of acronyms with their definitions, references, an index and appendices. The appendices provide maps and more information to support the analysis presented in this DEIS.

### **Project Record**

Additional documentation, including detailed specialist reports underlying the background and analyses supporting this DEIS, is available from the administrative record (project record) at:

Wallowa Mountains Office, 201 East Second Street/P.O. Box 905, Joseph, OR 97846  
541-426-5546.

### **Acknowledgements**

In addition to those who helped prepare this DEIS (see "Preparers", Chapter 4), the Blue Mountains Restoration Strategy Interdisciplinary Team would like to acknowledge the input, collaborative efforts, inspiration, and support of the following people and organizations: Wallowa Whitman Forest Collaborative, Wallowa Resources, Blue Mountains Coalition of Collaboratives, Jimmy Kagan, Institute for Natural Resources, Mark Stern, The Nature Conservancy, Nicole Valliant, Western Wildland Environmental Threat Assessment Center, U.S. Forest Service Region 6 and Forest Health Protection staff, and Kevin Martin, Forest Supervisor, and his staff at the Umatilla National Forest.

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# Chapter 1. Purpose of and Need for Action

## Introduction

The Forest Service has prepared this environmental impact statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This environmental impact statement discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives.

Lower Joseph Creek Restoration Project (LJCRP) objectives are primarily driven by mutual goals for restoration of ecosystem resilience, and enhancement of the socioeconomic vitality of natural resource-dependent communities. This draft environmental impact statement (DEIS) represents one intermediate step in a collaborative, public planning process to determine the best course of action for the LJCRP landscape over the next 10-15 years. The DEIS informs selection of the best course of action by considering current and desired conditions, and the best available science concerning ecosystem sustainability and socioeconomic vitality related to National Forest System (NFS) lands. The LJCRP is on the Wallowa Valley Ranger District of the Wallowa-Whitman National Forest (WWNF), in the Blue Mountains of northeast Oregon (Map 1, Appendix A). The “project area” includes only NFS lands within the larger analysis area. The analysis area for this DEIS encompasses the entire Lower Joseph Creek watershed, and portions of the Upper Joseph Creek watershed, or as defined specifically by resource, and defines only the area considered in the evaluation of cumulative effects. Alternative management actions analyzed in this DEIS only apply to the project area (i.e., NFS lands only).

## Background

In the Pacific Northwest (PNW), the current rate of restoration of forest resilience is not keeping pace with the need, particularly as it relates to the unintended effects of fire suppression on ecological health, public safety, and protection of resource values. Increased forest densification and shifts in tree species composition are ubiquitous conditions across the PNW (USDA Forest Service 2013a). Hence, in 2013, the PNW Region of the U.S. Forest Service established the Eastside Restoration Strategy<sup>1</sup> (ERS). The ERS focuses on accelerating restoration of ecosystem resilience at ecologically-significant scales, and breaking barriers to restoration related to traditional planning and project implementation processes. The ERS included the establishment of a dedicated interdisciplinary team (Blue Mountains Restoration IDT) to plan three large scale, accelerated forest restoration projects in the PNW region’s first geographic priority – the Blue Mountains of northeast Oregon and southeast Washington. There is also a Collaborative Forest Landscape Restoration project in the Blue Mountains (Malheur National Forest) with similar objectives. Given the requirements for environmental analyses prior to implementing Forest Service land management projects, accelerated restoration, in part, requires breaking barriers to efficient planning. The LJCRP is one of three regional projects the Blue Mountains IDT is using to increase the landscape available for restoration, and increased the pace of planning.

The Wallowa County Natural Resource Advisory Committee, the Wallowa-Whitman Forest Collaborative, and the Wallowa Mountains Office staff of the WWNF have invested considerable

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<sup>1</sup> The Eastside Restoration Strategy is focused on accelerating the pace and scale of forest restoration on National Forest Systems lands throughout eastern Washington and Oregon to promote forest and community health.

time assessing ecological conditions of the Lower Joseph Creek landscape with the intent to support acceleration of Forest Service project planning in the area (Wallowa County 2014). The LJCRP was identified as an out-year project for the WWNF. In July 2013, a coalition of five collaborative groups in the Blue Mountains convened a public meeting to discuss a suite of potential projects to be taken on by the ERS. The LJCRP had broad support as a potential test of new project planning processes, and a project of large enough landscape scale to advance accelerated restoration, yet small enough to be accomplished under an accelerated timeline by a dedicated planning team.

In August 2013, the ERS Board of Directors (BOD) reviewed input from the coalition of collaboratives and other sources, and selected the LJCRP for planning from October 2013 - December 2014. The LJCRP was selected by the ERS BOD primarily due to the active engagement of local and tribal governments and collaborators, the availability of Wallowa County's Lower Joseph Creek watershed assessment, and the presence of a local forest products industry. The ERS BOD determined that the LJCRP could test the value of a community-based watershed assessment to jump-start the NEPA planning process, and advance understanding of what it takes to achieve accelerated restoration planning in a collaborative environment.

The Wallowa County watershed assessment revealed mutual goals for landscape restoration, potential ecosystem restoration needs, and opportunities to contribute to local economies within the 98,600 acre LJCRP area. The Forest Service took that assessment, along with input from the public, tribes, collaborative groups, other government agencies, non-government organizations, and others to develop project objectives, the proposed action, and alternatives (see Public involvement section, below).

## **Forest Plan direction, and other key planning policies**

The scope process for NFS project planning is constrained by laws, government policies, and tribal trust responsibilities. This project is tiered to the WWNF Land and Resource Management Plan (forest plan) ROD and FEIS as amended (1990). The forest plan provides primary guidance for where and how each management activity can occur on the WWNF. It establishes goals, objectives, and desired future conditions, identifies management areas within the Forest, and provides standards and guidelines for implementation (USDA Forest Service 1990). Map 2 (Appendix A) illustrates Forest Plan management areas within the LJCRP boundaries (see the Forest Plan, table 4-5, p. 4-17 for generally accepted management activities by management area). The wildlife/timber production/winter range emphasis Management Area (MA 3) makes up 36% of the project area, while the timber production emphasis (MA 1), HCNRA forage emphasis (MA 10), and HCNRA dispersed recreation/timber production emphasis (MA 11) areas make up 28%, 14%, and 9% of the project area, respectively. The HCNRA dispersed recreation/native vegetation emphasis (MA 9), designated old growth (MA 15), wild and scenic rivers (MA 7), and research natural areas (MA 12) make up 6%, 3%, 3%, and 1% of the project area, respectively. The LJCRP was designed in response to Forest Plan goals for maintaining historic plant communities and maintaining ecosystem function (p. 4-30); minimizing insects and disease damage (p. 4-48); minimize the risk of fire damage (p. 4-48) and timber management consistent with various resource objectives, environmental requirements and economic efficiency (pp. 4-48 through 4-51). This project also tiers to the Hells Canyon National Recreation Area (HCNRA) Comprehensive Management Plan (CMP) ROD for the FEIS, where it overlaps the HCNRA (USDA Forest Service 2003).

The WWNF Forest Plan is currently under revision. Efforts were made to align wherever possible, desired conditions of the LJCRP with the current Forest Plan, and the DEIS for the Forest Plan revision. Amendments made to the WWNF forest plan, and other key guiding federal and state policies are listed below. See Appendix B for more information.

- 1855 Nez Perce Tribe Treaty with the United States (Figure 1).
- 1993 Eastside Screens, implemented to preserve late-successional/old-growth forests on the eastside of the Cascade crest in Oregon and Washington (forest plan amendment)
- 1994 Environmental Justice EO 12898 of February 11
- 1995 “Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California” (PACFISH) Decision Notice forest plan amendment (US Department of Agriculture 1995)
- 1998 Biological Opinion on Snake River Basin LRMPs and RMPs for Snake River Steelhead and Spring/summer Chinook Salmon (National Marine Fisheries Service 1998)
- 1998 Biological Opinion on effects to Bull Trout from Implementation of LRMPs and RMPs as amended by INFISH and PACFISH (USDA Fish and Wildlife Service 1998)
- 1999 Invasive Species Executive Order (EO) 13112 of February 3
- 2001 Migratory Birds EO 12962 of January 10 2004 Programmatic Agreement between Region 6 of the Forest Service and the Oregon State Heritage Protection Office (SHPO)
- 2005 USDA Forest Service, PNW Region Invasive Plant Management Record of Decision
- 2006 Wallowa County Community Wildfire Protection Plan
- 2007 USFWS Recovery Plan for *Silene spaldingii* (Spalding’s catchfly)
- 2008 USDA viability regulation 9500-004
- 2010 Final EIS for the WWNF Invasive Plants Treatment (supplemental EIS (SEIS) in process)
- 2010 Lower Grande Ronde Subbasins TMDLs
- 2013 National Strategic Framework for Invasive Species Management
- 2013 Oregon Dept. of Agriculture Noxious Weed Policy and Classification System
- Laws and Executive Orders guiding Tribal consultation responsibilities
- Forest Service policies (FSM 1563.03) to maintain a government-to-government consultation relationship with federally recognized Tribes
- Forest Service policy (FSM 2020.3) (working with Tribes)
- Section 7 CFR 2.42, 36 CFR 251.23, 36 CFR 219.25 Forest Service Manual 4063, and “A Guide for Developing Natural Area Management and Monitoring Plans” for the establishment of research natural areas.
- Forest Service Manual 2670 Regional Forester Sensitive Species direction
- National Forest Management Act (NFMA), National Environmental Policy Act (NEPA), Council on Environmental Quality Regulations (CEQ), Clean Water Act (CWA), Clean Air Act (CAA), National Historic Preservation Act (NHPA), Endangered Species Act (ESA)

- Regional Water Quality Control Board Requirements
- Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds)
- ORS 2013 564.105 (protection and conservation of Oregon native plants)
- Oregon Administrative Rules (OAR) 629-048-0001 to 629-048-0500 (Smoke Management Rules) within any forest protection district as described in OAR 629-048-0500 to 0575.
- Other relevant Federal and State laws and regulations, and Forest Service manuals and handbooks.

## Purpose and Need for Action

### The Lower Joseph Creek Landscape

The LJCRP lies on the northern boundary of the WWNF, approximately 20 miles north of Enterprise, Wallowa County, Oregon (Map 1, Appendix A). The project area is bounded by Cold Springs Ridge to the northeast, Forest Road 46 to the east, and Elk Mountain to the south. The northeast side of the project area includes portions of the Hells Canyon National Recreation Area (HCNRA).

Other lands adjacent to the LJCRP analysis area are either under private ownership (to the west, north and southwest), federal jurisdiction in the Hells Canyon National Recreation Area (HCNRA) (to the east), or part of the WWNF (to the south and southeast). Lands under private ownership are managed primarily for grazing, timber production, and hunting. An analysis conducted during the Watershed Condition Framework Assessment by the WWNF indicate slightly more impaired watershed function on adjacent private lands than that of the federal lands and those lands managed by the Nez Perce (Map 6, Appendix A). The Nez Perce are actively engaged in restoration activities on lands known as Precious Lands to the north of the project area. The HCNRA has lower road densities and its management has been less intensive than much of the surrounding federal lands. The surrounding Forest Service lands have been managed with similar overall intensity and its watershed function was similarly classified as “functioning at risk”.

The LJCRP contains NFS lands in the upper reaches of the Joseph Creek drainage, which is a tributary to the Grande Ronde River (Map 3, Appendix A). The project area is characterized by deep forested canyons interspersed with very steep, grass-covered side slopes and jagged basalt outcrops. Joseph Canyon is the birthplace of Chief Joseph and is the traditional homeland of the Chief Joseph Band of the Nez Perce tribe. Prior to European settlement, the Nez Perce used the canyon bottomlands as a travel corridor during their seasonal rounds traveling between summer camp sites in the Wallowa Valley to winter camp sites along the Grande Ronde and Snake rivers. Elk, bighorn sheep, and mule deer were plentiful, as well as native plant foods associated with bunchgrass habitat.

Vegetation of the LJCRP is generally composed of dry and moist coniferous forest (56% of project area), and grasslands and shrublands (43%). Elevations range from about 3600 to 5000 feet in the project area (NFS lands). The LJCRP project area provides habitat for a number of Forest Service management indicator species (MIS) and sensitive species, such as the northern goshawk, pileated woodpecker, American marten, white-headed woodpecker, fringed myotis, Lewis’ woodpecker, peregrine falcon, gray wolf, Townsend’s big-eared bat, spotted bat, Rocky Mountain tailed frog, bald eagle, Snake River steelhead, redband trout, and Columbian spotted

frog. Nez Perce lands on the northern boundary provide similar habitat for many of the same species (Sondenaa and Kozusko 2003b).

Natural ecosystems have been supporting the socioeconomics of human populations for at least 600 years, and natural ecosystem structures and functions have, at the same time, been affected by humans in both beneficial and adverse ways. Prior to Euro-American settlement, and continuing into the treaty era and present day, the Nez Perce Tribe have played a significant role in shaping the physical environment of their aboriginal homelands. “Wild” horticulture involving intentional “firing” of forests and prairies was used to improve hunting and “berrying” as well as increase the quantity and quality of camas, and other root and bulb species (Marshall 1999). Between the 1400s and 1800s, eastern Columbia plateau Indian tribes had a relatively light impact due to nomadic lifeway and reliance on predictable, managed and sustainable subsistence resources. In the 1700s, the Nez Perce began grazing horses, and in the 1830s began grazing cattle on the canyon grasslands. European settlement and increased population levels introduced more intensive resource uses and ecological impacts. Beginning in the mid-1800s, pioneer settlers homesteaded in the area, grazing sheep and cattle, raising hogs and planting fruit orchards. The watershed has been grazed continuously to some extent since the 1730s. However, the rocky terrain prohibited extensive agricultural production (Sondenaa and Kozusko 2003b). The Wallowa Forest Reserve was established in 1905, and through additional reserves and consolidations of public lands, subsequently the area became part of the WWNF.

## **The need for restoration**

Due primarily to increased populations, and the types of land management following European settlement (e.g., fire suppression, timber harvest, domestic livestock grazing, road construction), current conditions of the LJCRP area differ from desired conditions to varying degrees. Over the last few decades, due to past management practices such as selectively harvesting the largest trees, overgrazing, and fire suppression as land managers have increasingly understood the unintentional adverse consequences of some land management policies and tactics, they have been adjusted to be more ecologically appropriate. Nonetheless, the LJCRP area continues to exhibit reduced health and resiliency as a result of the past policies, and is in need of restoration. Local communities remain natural resource dependent to some degree, and need the raw material and jobs provided by restoration work and continued maintenance.

Table 1 compares existing and desired conditions for a suite of representative indicators of ecological health and resilience, and socioeconomic contributions to human communities. This project is expected to move the Lower Joseph Creek landscape toward a more desirable<sup>2</sup>, resilient condition to support lasting human resource uses, forest structure and pattern, forest health, natural disturbance regimes, vegetation composition and diversity, fish and wildlife habitat, soil productivity, and watershed function. It also aims to maintain healthy and restored conditions for future generations.

## **Desired and existing conditions**

This section describes the existing and desired conditions for the LJCRP area, the differences between desired and existing conditions, and the need for the project. Desired conditions are based on scientifically-derived, ecologically-based reference conditions. Reference conditions (natural and/or historical ranges of variation) for forested and riparian vegetation, wildlife

<sup>2</sup> In general, desired conditions are based on 1) what is assumed to be natural ranges of variation, 2) Forest Plan and other guidance, and 3) local socioeconomic and ecological contexts.

habitat, and disturbance processes have been estimated for the Blue Mountains National Forests through literature review (Powell 2012), and localized state-and-transition simulation modeling (Appendix C). Ecologically-based references for forest patterns were based on literature reviews, expert opinion, and quantitative analysis of historical patch size distributions from aerial photographs (Hessburg et al. 1999). The “Affected Environment” sections of Chapter 3 provide more information on the ranges in reference conditions and desired conditions used in this DEIS. These ranges of variation in conjunction with the Forest Plan and other policies and guidance, and collaboration with tribes, Wallowa County, and public were used as the primary basis for developing the desired conditions for the LJCRP.

One key ecological factor making up the foundation for analysis of departure between current and desired conditions, and the need for restoration is ecosystem resilience. Highly resilient ecosystems are better able to survive natural disturbances such as fire, insects, diseases, and climate change (USDA Forest Service 2013b) than less resilient ones. Ecosystems are most resilient and resistant to disturbance when they are similar to conditions under which they developed over the long term (Morgan et al. 1994). A system in which natural levels of variation have been reduced will be less resilient to change than one exhibiting more natural variation (Holling and Meffe 1996). By restoring and maintaining natural ranges of ecosystem structures and functions, forest health and sustainability, and ecological resilience will be improved across the landscape. Information about historical ranges of variation often provides the best, if not the only, indication of natural, ecologically sustainable ranges of variation. Broad-scale assessments completed for the Blue Mountains physiographic province and the interior Columbia River basin suggest that upland forest ecosystems could be characterized as healthy, sustainable, and resilient if three of their ecosystem components – species composition, forest structure, and tree density – are within the natural, or historic range of variation (NRV, HRV), which developed under historical disturbance regimes (Gast et al. 1991, Caraher et al. 1992, Lehmkuhl et al. 1994, Quigley et al. 1996).

**Table 1 Comparison of existing and desired conditions of selected attributes for the Lower Joseph Creek Restoration project area**

Indicator	Metrics	Units	Existing condition	Long-term desired condition
<b>Vegetation structure and composition</b>	Ponderosa pine cover type (% of dry upland forest)	%	28	50-80
	Douglas-fir cover type (% of dry upland forest)	%	51	5-20
	Old forest single story structure (% of dry upland forest)	%	0	40-60
	Old forest single story structure (% of moist upland forest)	%	0	10-20
	Young forest and understory reinitiation structure (% of dry upland forest)	%	45	5-10
	Young forest and understory reinitiation structure (% of moist upland forest)	%	36	10-20
	High density class (% of dry upland forest)	%	33	5-15
	High density class (% of moist upland forest)	%	45	15-30
<b>Vegetation pattern</b>	% of forest treated with an “individuals, clumps, and openings” prescription based on natural stand patterns	% forested area	0	100
<b>Insects and Pathogens</b>	% of dry upland forest highly susceptible to defoliators	%	39	5-15
	% of dry upland forest highly susceptible to Douglas fir beetle	%	45	10-25
	% of dry upland forest highly susceptible to Douglas-fir dwarf mistletoe	%	47	20-35
<b>Native plant diversity</b>	Diversity score (Shannon-Wiener index) Based on the chance of encountering the same plant species in consecutive samples, includes native and non-native species.	Index	3.9 to 4.4 depending on habitat	Maintain
<b>Ecological resiliency – fire</b>	% Fire regime (vegetation departure) departure from HRV summarized at 5 <sup>th</sup> field watershed level	%	29-39	<33
<b>Riparian management objectives</b>	Qualitative measure of departure from HRV	Categorical	Outside the acceptable range	Meet RMOs
<b>Road Network</b>	Open road density Management Area 1	Miles/sq mile	2.53-4.34	2.5
	Open road density Management Area 3		0.20-1.44	1.5
	Open road density HCNRA		0.54-1.37	1.35
	Total road density by subwatershed		1.1-1.3	2.0

Based on comparisons between the 1990 WWNF forest plan (USDA Forest Service 1990), tribal trust responsibilities, the best available science, community socioeconomics, and existing landscape conditions, priority restoration needs in the LJCRP area include reducing tree densities, woody fuels and fuel ladders, uncharacteristic fire behaviors, and degradation of aquatic and riparian conditions. By increasing the abundance of open, early seral, large-tree dominated forests, productive and diverse forest understories, native grasslands, healthy fish and

wildlife habitat, and natural fire regimes, the landscape could be brought more in line with historical and anticipated future reference conditions. Proposed treatments would reduce the departure between current and desired ecological conditions.

## Vegetation and Disturbance

This section describes the differences between desired and existing vegetation and disturbance conditions for the LJCRP area. One key focus of the LJCRP, as determined by project scoping and Forest Service regional and forest priorities, is the need for restoration of forest structure and composition. Other related considerations include the viability of threatened, endangered and sensitive plant, wildlife, and aquatic species, forested habitats supporting wildlife species, and forested riparian habitats supporting aquatic systems and species.

Table 2 summarizes the extent of potential vegetation groups (PVGs, (Powell et al. 2007)) in the project area. See Chapter 3 for more detail).

**Table 2. Extent of major vegetation types in the Lower Joseph Creek Restoration project area**

Physiognomic Type	Potential Vegetation Group	Acres	% of Project Area (Physiognomic Type)	% of Project Area (Potential Vegetation Group)
<b>Conifer</b>		55,365	56%	
	Dry upland forest (DUF)	42,407		43%
	Moist upland forest (MUF)	12,958		13%
	Other	191		<1%
<b>Non-Conifer</b>		42,815	43%	
	Cold upland herb	31		<1%
	Moist upland herb	4,217		4%
	Dry upland herb	37,470		38%
	Dry upland shrub	959		1%
	Other	138		<1%
<b>Unknown</b>		398	1%	1%
<b>Totals</b>		98,578	100%	100%

## Natural and human-caused disturbance

Natural disturbances are those under which ecosystems developed and were maintained over the long-term (Hardy et al. 2001, Schmidt et al. 2002). Fire is the dominant natural disturbance regime in the project area. Disturbance regimes (e.g., fire, insects, disease, and weather events, including droughts and floods) can be described as a combination of frequencies and severities. Fire regime groups, naturally-occurring combinations of fire frequency and severity (Barrett et al. 2010), are a relevant way to describe fire regime conditions and effects at the scale of the

LJCRP. Table 29 (Chapter 3) describes the characteristics of fire regime groups. Tables 3 and 4 compare desired and existing fire regimes, and probabilities of different fire severities for the major vegetation types within the project area. Current fire severity probabilities were modeled specifically for this project area (see Appendix D for modeling methods). This model uses historical fire ignition points and weather recorded for the day of the start. It does not model the 97<sup>th</sup> percentile extreme weather events that may coincide with fire ignition. This is especially important in the moist upland forest (13% of the LJCRP area) when considering the existing burn probability and the wide margin for average return intervals for each fire severity class (Table 4). Desired probability and average interval were derived from Landfire Rapid Assessment modeling and validated by local experts.

As a consequence of the past timber harvest, fire suppression, introduction of non-native plant species, and livestock grazing, the national forests within the Blue Mountains are substantially different from those that existed a century ago (Munger 1917). Dry upland forests (43% of the LJCRP area) have experienced the greatest amount of departure from historical conditions. Fire history research across the Blue Mountains and western United States has provided support for local efforts to establish historical fire return intervals through fire and mechanical means (Hall 1977, Crane and Fischer 1986, Agee and Maruoka 1994, Maruoka and Agee 1994, Heyerdahl and Agee 1996, Heyerdahl 1997, Olson 2000, Stephens et al. 2009, McIver et al. 2012). Dry upland forests have now missed several natural fire cycles due to over a century of fire exclusion and suppression, which has resulted in increases in fuel loadings and the number of smaller trees. The departure in dry forests from the historic range of variation (HRV) in the HCNRA, in-part due to past wildfire, generally differs from the rest of the LJCRP area in that there is a greater abundance of younger forests in need of increased structural diversity and growth toward larger size classes. Additionally, historic grazing removed the fine fuels that carried low severity surface fires. Without competition from grasses, tree regeneration increased substantially. Tree regeneration that historically would have been thinned by fire continued to grow into dense stands and form multi-storied, closed canopies. The historically open stands within dry upland forest, with their mosaic pattern of tree clumps or patches and openings, have now filled in with younger trees, resulting in a more uniform stand structure, increased ladder fuels, increased stand densities, increased fuel continuity, and decreased spatial heterogeneity. Increased stand densities and a reduction in low severity fire events on dry sites have also contributed to a shift from shade intolerant, fire tolerant tree species, such as ponderosa pine and western larch, to more shade tolerant, fire intolerant species, such as grand fir. Increased stand densities have also contributed to a decrease in the abundance and diversity of understory grasses, forbs, and shrubs.

Shifts in the vegetation structure and composition of dry forests (single to multi-storied), density (ingrowth), and composition (increase of shade tolerant species) affect fire severity in several ways including increasing the likelihood of replacement severity crown fire due to increased fuel loading and reduction in distance between surface and canopy fuels (ingrowth + multi-story + increased landscape continuity). An increase in fire intolerant species such as grand fir along with the densification of forest stands likewise increases severity ratings due to each species relative resistance to fire (composition). An increase in fire intolerant species will result in higher fire severity ratings due to their susceptibility to mortality as a result of fire. Fire severity describes the effect of fire to the upper level canopy cover (Barrett et al. 2010) in terms of the range of replacement. Table 5 shows the severity classes and their respective levels of replacement.

Moist upland forest is one of the most variable PVGs in the Blue Mountains relative to species composition. Therefore it is also variable in associated disturbance regimes (frequency, severity

and size). Fire behavior and effects to overstory vegetation are strongly related to seasonal drought stress, topography, existing cover composition and over-riding climatic factors, such as El Nino Southern Oscillation (ENSO) influences. Additionally the relative juxtaposition of these forests in relation to lower elevation dry upland forest and non-forest (grass and shrubland) influence the composition, frequency of disturbance and severity to overstory vegetation. The biophysical landscape within LJCRP indicates a high interrelationship between dry and moist upland forest and non-forest disturbance. Relatively frequent low to mixed severity fire would be expected to occur more often and replacement severity fire to occur more infrequently than indicated in Table 5 in moist upland forest, especially at the blended edge between dry and non-forest. In general, replacement severity regimes in moist upland forests usually results in heterogeneous landscapes. Large, high-severity fires are usually rare events, and may affect large areas (10,000-100,000 acres), but subsequent mixed-severity fires are important for creating the landscape heterogeneity. Within these landscapes a mix of stand ages and size classes are important characteristics; generally the landscape is not dominated by one or two age classes (Stine et al. 2014).

Moist upland forests in the project area currently have a higher potential for replacement severity fires than historically or desired, and the effects of replacement fires are uncharacteristic relative to those typical of fire regime group III (Table 3). Fire return intervals have been missed but not to the same degree as the dry upland forest. However fuels accumulation rates in moist forests far exceed those of dry forests due to higher productivity soils. This means it takes less missed return intervals to create an uncharacteristic fuel loading and resultant fire behavior.

To restore fire-related disturbance regimes toward desired conditions in the LJCRP area, fuels must be strategically reduced in appropriate locations. Tools available to reduce fuels include thinning toward more natural forest structures, and the ecologically- and socially-appropriate use of planned and unplanned fire. For more detail on disturbance regimes of the project area, see “Affected Environment”, Chapter 3.

**Table 3. Desired and existing fire regimes for the major vegetation types within the project area (Adapted from Barrett et al. 2010 and Stine et al. 2014).**

<b>Vegetation Type</b>	<b>Existing Fire Regime (see table 29)</b>	<b>Desired Fire Regime (see table 29)</b>	<b>Description</b>
Dry Upland Forest	Fire Regime Group III (IIIa)	Fire Regime Group I	Existing fire regime displays a higher proportion of the landscape experiencing moderate/mixed severity fire than characteristic of the vegetation type. Restoration of forest characteristics including fuel reduction will move the landscape towards a higher percent of low severity fire although some mixed and high would still be a desirable part of the vegetation type.
Moist Upland Forest	Fire Regime Group III (IIIb/IIIa)	Fire Regime Group III (IIIa)	Existing fire regime displays a higher proportion of replacement severity in this vegetation type than desired in the LJCRP. Effects would be uncharacteristic when compared to the desired Fire Regime Group of IIIa that is typified by the majority of moist upland forest that exists in the LJCRP area as described by Stine et al. 2014. Fire return intervals have been missed but not at the same magnitude as the dry upland forest (DUF), however fuels accumulation rates far exceed DUF due to higher productivity soils. This means it takes less missed return intervals to create an uncharacteristic fuel loading and resultant fire behavior.
Non-Forest	Fire Regime Group II	Fire Regime Group II	The non-forest systems are dominated by replacement severity fire disturbance that consumes the majority (>75%) of the overstory vegetation (e.g. grass, shrub, etc.). The bunchgrasses, however, rarely die in fires, and most of the shrub species, with the exception of sagebrush and bitterbrush are rhizomatous and root/crown sprout after fire. Fire effects to overstory vegetation have not departed from historical or desired conditions; however, grazing and presence of invasive species have changed the system such that certain areas are highly vulnerable to undesirable effects from fire. Fire exclusion in these areas has been effective in creating a similar number of missed intervals as the dry upland forest sites as evidenced by the intermixing of the landscape in grass tree mosaic and extensive lithosol areas. Lithosol communities produce little biomass and probably had less frequent fires than other grasslands, but pre- and post-fire vegetation is very similar (this does not include the rigid sage portions of the lithosols, which if burned take years to recover).

**Table 4. Severity class and effects to upper level canopy replacement.**

Severity Class	Effects
No Fire Effects	< 5 percent replacement
Low (non-lethal)	6 – 25 percent replacement
Mixed (mixed severity)	26 – 75 percent replacement
Replacement (stand replacement)	> 75 percent replacement

**Table 5. Existing and desired severity probabilities for the dry and moist upland forest potential vegetation groups.**

Fire severity class	Existing Probability (% of all fires)	Historical Severity Probability (% of all fires)	Average Interval (years)
<b>Dry upland forest (DUF)</b>			
Replacement	5	5 – 14	115 – 125
Moderate/Mixed	49	13 – 21	50 – 75
Low	46	64 – 82	8 - 25
<b>Moist upland forest (MUF)</b>			
Replacement	3	14 – 35	125 – 200
Moderate/Mixed	47	21 – 47	75 – 150
Low	52	18 – 64	25 – 50

In addition to fire disturbance, insects and diseases are also a natural disturbance with a characteristic frequency and severity in the project area. Under the Blue Mountains' normal moisture-limited conditions, densely-stocked stands of grand fir and Douglas-fir trees species, while differing in some ecological traits, both become stressed. This increases their vulnerability to insect infestation, and in the case of Douglas-fir, mistletoe infestation. Similarly, on pine sites, multi-storied, densely stocked ponderosa pine stands are at risk of insect infestation under drought conditions. These densely stocked and moisture-stressed stands have become more abundant during the last half of the 20th century, and localized insect infestations have quickly blossomed into outbreaks covering thousands of acres (Gast et al. 1991). Table 31 (Chapter 3) summarizes susceptibility to insect and disease mortality for the LJCRP. Although insect outbreaks likely occurred prior to the time of the first Euro-American settlers, the frequency and size of outbreaks caused by western spruce budworm species and possibly other insects that attack Douglas-fir and grand fir appear to have increased as a result of the proliferation of fir-dominated forests (Swetnam et al. 1995). Similarly, the multi-storied ponderosa pine stands that replaced the single-storied stands on pine sites have also increased the potential for outbreaks of the western and mountain pine beetles (*Dendroctonus brevicomis*, and *D. ponderosae*, respectively) (Hessburg et al. 1994). During the past 50 years, tree mortality from insect disturbances in some stands has exceeded 80 percent of all overstory trees (Swetnam et al. 1995). Most tree diseases are increasing in occurrence and severity due to changes in tree species composition (increased grand fir within dry upland forest), stand structures (increases in multi-storied structure), and increased stocking levels (Scott and Schmitt 1996). The abundance of insect-killed trees has substantially increased the surface fuel loads for thousands of acres across the Blue Mountains. Conditions became conducive for the occurrence of large, high-intensity

wildfires. From 1985 until 1994, lightning-caused wildfires burned more than 445,000 acres in the Blue Mountains. Many of these fires were high severity, stand-replacing events that killed most of the trees across large areas. Within the project area, two notable wildfire events have occurred within the last 30 years. The 1986 Joseph Canyon/Starvation Ridge fire burned over 40,000 acres within the project area and the 1988 Tepee Butte burned almost 60,000 acres of which 1/3 was in the project area. A high percentage of these fires were stand replacing and resulted in the stand initiation phase of succession. Since 2004, three wildfire events occurred within the project area, burning a total of approximately 23,750 acres.

To restore insect- and disease-related disturbance regimes in the LJCRP area, and move toward desired conditions, forest densities and species composition must be strategically restored in appropriate locations. Tools available to reduce uncharacteristic insect and disease disturbance include thinning toward more natural forest structures, and the ecologically- and socially-appropriate use of planned and unplanned fire. For more detail on insects and diseases of the project area, see “Affected Environment”, Chapter 3.

Historically, disturbance from timber harvest has differed from natural disturbances in its frequency, severity, pattern, and what remains on the landscape following tree harvest. Techniques to increase the similarity between human and natural disturbances have improved greatly over the past few decades (Diaz and Apostol, Franklin et al. 2013a).

The severity, extent, and seasonality of planned and unplanned fire can range from being very similar to natural fire disturbance to being very different. Fire suppression is a human-caused disturbance that, in most cases, alters the natural fire process, except where it is used to mitigate uncharacteristic fire severity, which could result from over abundant fuel loads. To reduce departure between the effects of human and natural disturbance processes, human-caused and natural disturbance frequencies, patterns, and intensities need to be more aligned. Tools available to reduce this departure include the use of ecologically-informed tree harvest and fire prescriptions.

Existing and desired conditions relative to road disturbance, and road management needs are discussed in the “Wildlife”, “Watershed, Aquatic, and Riparian Habitat”, “Tribal” and “Socioeconomic” sections below.

## **Vegetation structure and composition**

### **Forest structure and composition**

Table 1 compares current and desired conditions for selected vegetation indicators. Tables 25-27 (Chapter 3) more completely compare current conditions and the RV for forest density, structural stage distribution, tree size class, and composition (cover type) for the LJCRP. Existing and desired conditions of the project area’s riparian vegetation is discussed below in the section “Watershed, Riparian and Aquatic Habitat” section. For more detail on the management history, and vegetation composition and structure of the project area, see “Affected Environment”, Chapter 3.

### **Understory plant diversity, and threatened, endangered, and sensitive plants**

Desired conditions for native plant diversity and understory productivity are based on Forest Plan and Hells Canyon National Recreation Area direction, policy guidance, and literature reviews. Goals and objectives common to all guidance are to protect and maintain appropriate

habitats to ensure continued viability of TES, native, and other desirable plants (FSM 2672.41, WW LRMP, HCNRA CMP, ESA).

Table 1 compares existing and desired understory native plant diversity. Table 37 (Chapter 3) provides more detail on native plant diversity for the LJCRP and the Blue Mountains as a whole.

There are two federally listed threatened plant species with potential habitat modeled in the LJCRP area, MacFarlane's four-o'clock (*Mirabilis macfarlanei*), and Spalding's catchfly (*Silene spaldingii*) (Murray 2001). Upon review of field observations gathered during surveys conducted in 2003-4 and 2014, it was concluded that it was very unlikely that any MacFarlane's four-o'clock would be found in the area of Joseph Canyon that was administered by the Forest Service. It was concluded that better potential habitat exists further down canyon closer to the Snake River where Joseph Canyon is warmer and wider (Jerold Hustafa, District Botanist Wallowa Valley Ranger District, Joseph Oregon, pers.comm.)

Several populations of Spalding's catchfly are found in the Crow Creek and Romaine Gulch vicinities adjacent to the southeast portion of the LJCRP. Approximately 26,000 acres of potential Spalding's catchfly habitat are modeled within the Forest Service lands in the Lower Joseph Creek watershed. The model has been helpful in determining unlikely habitat for Spalding's catchfly, but not as effective in locating populations (Hustafa, pers. comm.). Map 4 (Appendix A) displays areas where surveys have been conducted for this and other sensitive species within the LJCRP between 2003 and 2014. LJCRP will be analyzed for effects to Spalding's catchfly habitat, although no plants have been found to date.

There are five R6 Regional Forester's listed sensitive plant species known to occur within the LJCRP area. These species are Wallowa ricegrass, (*Achnatherum wallowaensis*), green-band mariposa lily (*Calochortus macrocarpus* v. *maculosus*), rough rabbitweed (*Pyrocoma scaberula*), Snake River daisy (*Erigeron disparipilus*), and Davis fleabane (*E. engelmannii*). Wallowa ricegrass, Snake River daisy, and Davis fleabane are found in lithosol habitats. Rough rabbitweed and greenband mariposa lily are found in grasslands and open dry forest margins. Table 36 (Chapter 3) summarizes the sensitive plant species that are known or suspected to occur in the project area by habitat type.

More information on TES, sensitive plants, and other plant species of interest can be found in the Plants section of Chapter 3.

### Non-native invasive plants

Desired conditions relative to non-native invasive plant species are to protect, restore, and sustain terrestrial and aquatic ecosystems, ecological functions and values; protect and improve biodiversity; improve and protect public recreational opportunities and wilderness integrity; prevent negative impacts to human health and the economy, and protect and restore fish and wildlife populations and habitats (USDA Forest Service Pacific Northwest Region 2005). Map 5 (Appendix A) shows non-native plant species locations, and Appendix H summarizes non-native plant species found within the LJCRP area.

Due to litigation of the Final 2010 Wallowa-Whitman National Forest Invasive Plants Treatment EIS, use of chemical invasive plant treatments within the LJCRP area is limited (more information can be found in Chapter 3, and the section "Policy, legal, social and economic constraints on the decision space", above).

## Range

Desired conditions for rangelands are to manage range vegetation and related resource in a manner insuring that the basic needs of the forage and browse plants and the soil resource are met, and to make available for harvest, forage production that is in excess to the basic needs of the plants and soil resource, for wildlife (within agreed upon management objectives) and domestic livestock (within forest plan utilization standards). Countryman (2012) found that conditions had improved in the dry shrubland potential vegetation group from 30 years earlier, but that this improvement has slowed. The dry herbland potential vegetation group has experienced invasion by nonnative plants resulting in conversion of some lands to exotic herblands (Hann 1997).

While livestock grazing was not identified as a key issue to be addressed in this project, existing and desired conditions of native and domestic grazing disturbance is tied to the condition of other disturbances, such as forest management and fire, which indirectly influences the distribution and seasonality of understory forage. Domestic livestock grazing, as it relates to the LJCRPs affected environment, and project effects are discussed under “Rangelands”, in Chapter 3.

## Wildlife habitat

The National Forest Management Act (NFMA) directs the Forest Service to provide habitat to maintain viable populations of existing native and desired non-native vertebrate species. Rather than addressing all wildlife species, discussions in this DEIS focus on forest plan management indicator species (MIS), threatened, endangered and sensitive (TES) species, and landbirds.

### Management indicator species - Wildlife

HRV estimates for habitat were derived for the Blue Mountains Plan Revision DEIS (USDA Forest Service 2014). Dead wood reference condition (HRV) is derived from DecAID distribution histograms (Mellen-McLean et al. 2012). Scientists assume that species are more likely to persist under the conditions that remain most similar to those that existed in the past (Landres et al. 1999), Samson et al. 2002). It is assumed that maintaining habitat within HRV will provide adequate species population viability for the present suite of species. Individual species population viability is increasingly compromised as departure from HRV increases (see Chapter 3 for more information on the estimation of current and reference habitat conditions).

Primary changes to wildlife habitat in the last 150 years since European settlement have been the loss of old forest habitat (due to intensive timber harvesting, uncharacteristic wildfire, and density related tree mortality), and the degradation of habitats (e.g., ponderosa pine forest, riparian) from a number of factors including timber harvest, fire suppression, over-grazing, invasion of exotic vegetation, and human development. The loss and alteration of historic vegetation communities has impacted wildlife habitats and resulted in species range reductions, population declines, and some local and regional extirpations. In general, for moist forest types, the LJCRP area is low in the abundance of smaller trees, and is currently at the low end of large tree closed canopied habitat. Generally there is an abundance of medium and large-medium trees (10-20” dbh), and habitat >10” dbh with open canopies (<60% canopy closure) as compared to the reference range of variation. In dry forests, the LJCRP is below the range of variation in large tree, open canopied habitats, and above the range of variation in the medium and large-medium (10-20” dbh), closed canopied structural stages.

Management Indicator Species (MIS) were selected for emphasis in forest-level planning, and are assessed during forest plan implementation in order to determine the effects of management activities on their populations and the populations of other species with similar habitat needs. The amount and quality of habitat is used as a proxy for determining project effects on MIS.

Table 6 lists the terrestrial species selected as MIS in the Wallowa-Whitman forest plan, their habitat, and likelihood habitat in the project area. All of these MIS have habitat and likely occur in the project area though habitat for the American marten is limited and presence of this species within the analysis area is unknown.

**Table 6. Wildlife management indicator species identified in the Wallowa-Whitman forest plan.**

Species	Representing	Habitat Description	Habitat Present in Analysis Area	Species Present in Analysis Area
Primary cavity excavators <sup>1</sup>	Dead & defective wood habitat	Snags and logs	Yes	Yes
Pileated woodpecker	Old growth and mature forests	Closed canopy, late-seral subalpine, montane and lower montane forests	Yes	Yes
American (pine) marten	Old growth and mature forests	Closed canopy, late-seral subalpine and montane forests	Limited	Unknown
Northern Goshawk	Old growth and mature forests	Subalpine and montane forests, lodgepole pine, post-fire habitat	Yes	Yes
Rocky Mountain Elk	Species commonly hunted	Cover and forage	Yes	Yes

<sup>1</sup> Northern flicker; black-backed, downy, hairy, Lewis', three-toed, and white-headed woodpeckers; red-naped and Williamson's sapsuckers; black-capped, chestnut-backed, and mountain chickadees; and pygmy, red-breasted, and white-breasted nuthatches.

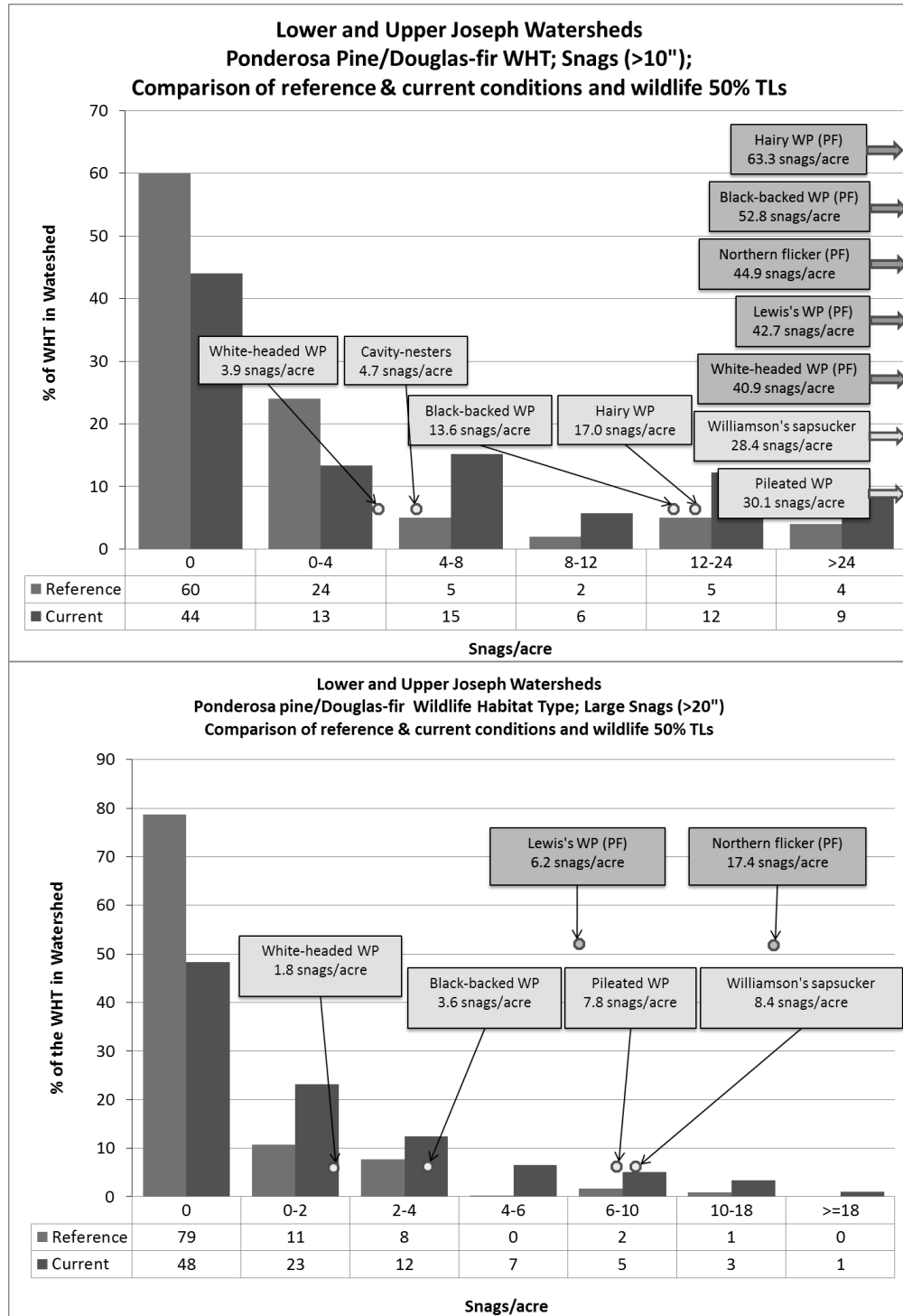
### *Primary cavity excavators*

In general, populations of cavity nesting birds have declined across the Blue Mountains compared to historical conditions, primarily due to reductions in the numbers of large snags (Wisdom et al. 2000). However, of the cavity excavating MIS, Breeding Bird Surveys in Oregon have only detected a significant decrease in populations of the northern flicker between 1966 and 2010 (Sauer et al. 2011).

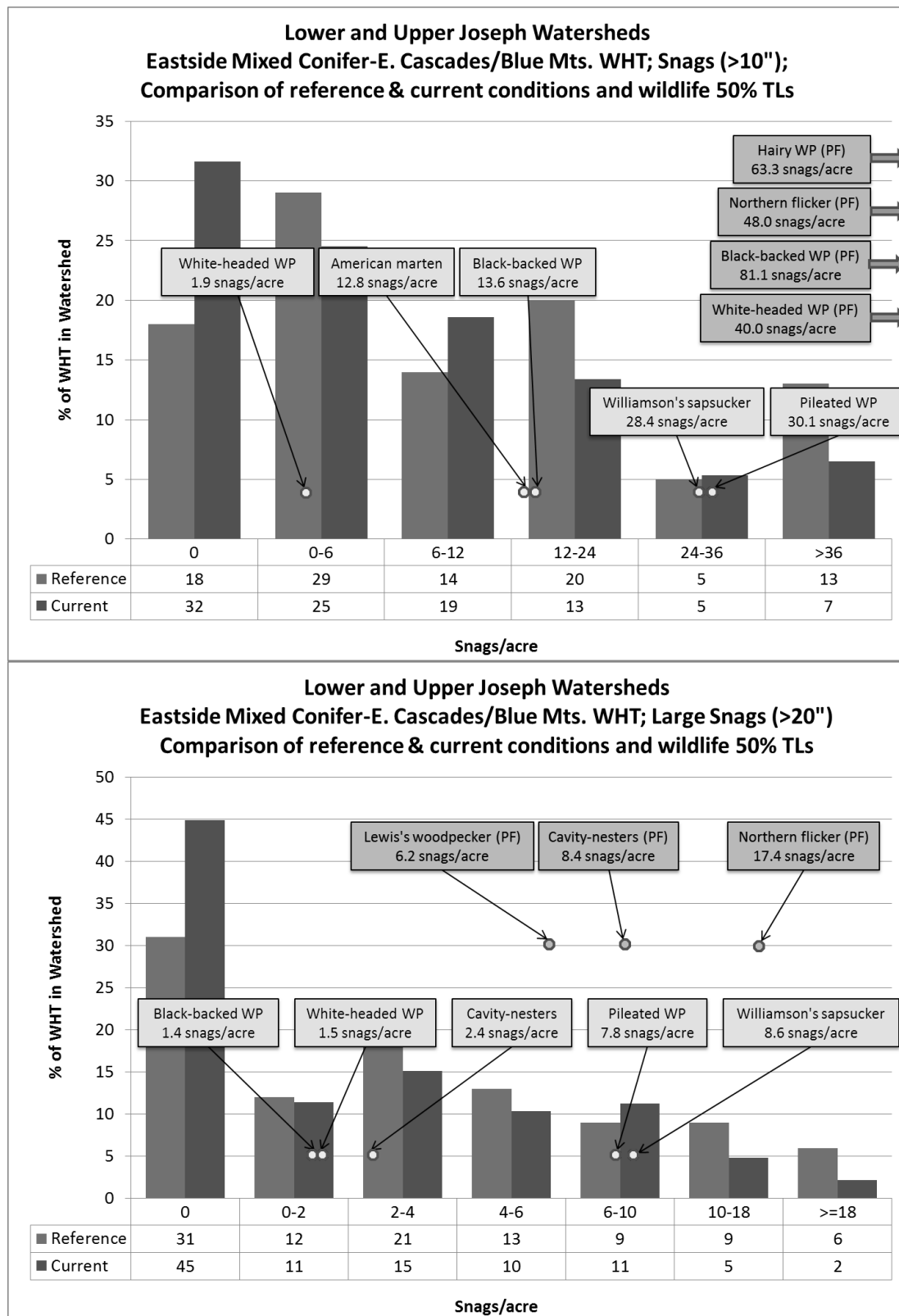
Table 43 (Chapter 3) shows the conservation status of cavity excavators, and Figures 1 and 2 summarize desired and current snag habitat conditions for woodpecker species in the LJCRP area.

Snag habitat is currently adequate in the Ponderosa Pine/Douglas-fir Wildlife Habitat Type (PPDF WHT), and below reference conditions in the Eastside Mixed Conifer Wildlife Habitat Type (EMC WHT). In the EMC WHT, the landscape is deficit in snag density classes above 2 per acre for large (> 20" dbh) snags, as compared to reference conditions. Figure 3 shows a

comparison of reference and current conditions for snag density classes in the EMC WHT portion of the LJCRP analysis Past management and fire wood cutting has likely had an influence on the current conditions of snag habitat. See Chapter 3 for more information.



**Figure 1. Desired and current snag habitat conditions in the ponderosa pine/Douglas-fir wildlife habitat type for cavity nesting species in the LJCRP area for snags >10" (top) and >20" (bottom).**



**Figure 2. Desired and current snag habitat conditions in the eastside mixed conifer wildlife habitat type for cavity nesting species in the LJCRP area for snags >10" (top) and >20" (bottom)**

### *Old forest wildlife habitats*

Three species were selected in the forest plan to represent old growth habitats that have habitat in the LJCRP area: pileated woodpecker, American marten, and goshawk. Due to an increase in dense, multi-canopy stands due to fire suppression, habitat for these species is increasing across the Blue Mountains (Wisdom et al. 2000). However, densities of large-diameter snags (>21 inches dbh) needed by these species have declined from historical to current levels (Wisdom et al. 2000, Korol et al. 2002), and snag habitat is likely to be a limiting factor in the Eastside Mixed Conifer WHT (See Chapter 3 for more information). Currently goshawk habitat is above HRV in the LJCRP area.

### *Rocky Mountain Elk*

Rocky Mountain elk are a management indicator species for the WWNF. Elk have been selected as an indicator of habitat diversity, interspersed cover and forage areas, and security habitat provided by areas of low human disturbance. Elk management on the WWNF is a cooperative effort between the Forest Service and the Oregon Department of Fish and Wildlife (ODFW). The Forest Service manages habitat while ODFW manages populations by setting seasons, harvest limits, and goals for individual Wildlife Management Units (WMU).

In general, a mosaic of forage and cover areas in a given landscape, with minimal or no motorized access through forage areas, results in high to optimal elk use during any given season. This would be the desired condition for landscapes where elk use is promoted, as identified in coordination with state wildlife agencies. For many winter ranges, this desired condition would emphasize the maintenance of existing cover areas, which often compose smaller portions of these landscapes, while also focusing on minimizing or eliminating motorized access and uses on winter ranges during the winter period. For many spring, summer, and fall ranges, this desired condition would emphasize the maintenance of adequate forage areas close to cover and far from roads and trails open to motorized uses. For landscapes where hunting occurs, the desired condition would emphasize motorized access restrictions on roads and trails during hunting seasons to a degree that elk can effectively use cover and topography as security. This approach at managing the desired condition would place more emphasis on motorized closures of roads and trails during hunting seasons for landscapes that are flat and open, and less emphasis on those that are steep and have more cover, as identified in coordination with state wildlife agencies.

The Forest Plan establishes standards for wildlife habitat, and more specifically elk habitat, on the Forest. The LJCRP area provides year round habitat for big game; winter range lies along the northern and western portion of the analysis area, transitional range is mid-slope and summer range lies along the central portion of the analysis area.

Within the Lower Joseph project area there are parts of two WMUs: Chesnimus and Sled Springs (Figure 11, Chapter 3). Table 7 shows the recent trend in populations and the management objectives for the two management units. Currently the populations and bull/100 cows ratios are exceeding the management objectives set by ODFW in both management units.

According to ODFW (Pat Mathews, ODFW, pers. comm. 2014), the Chesnimus unit is currently 40% over population management objective with up to 70% of the population occurring on Zumwalt prairie private lands. The ODFW is currently trying to reduce elk numbers and return the elk population to management objective of 3,500 by harvesting antlerless elk on Zumwalt private lands. Elk numbers on the National Forests are much below desired

levels, so very little antlerless elk harvest occurs on the national forest portion of the Chesnimnus unit. Managing road density is important for security areas and bull escapement during hunting seasons.

**Table 7. Population Trend data Rocky Mountain Elk (ODFW 2014)**

Management Unit		Population	Bulls/100 cow
<b>Chesnimnus</b>	<b>MO*</b>	<b>3,500</b>	<b>10</b>
	2010	3,700	13
	2011	5,300	15
	2012	5,300	13
	2013	5,200	14
	2014	5,000	14
<b>Sled Springs</b>	<b>MO*</b>	<b>2,750</b>	<b>10</b>
	2010	2,500	4
	2011	2,700	10
	2012	2,700	10
	2013	3,000	16
	2014	3,100	16

\*MO = Management Objective (ODFW)

Research conducted at the Starkey Experimental Forest and Range and associated research sites is providing new insights regarding the importance of maintaining adequate nutritional resources for elk (Cook et al. 2013), and of minimizing human disturbance effects through effective management of motorized access and cover (Rowland et al. 2000, Naylor et al. 2009). Higher nutritional resources are generally concentrated in elk forage areas, defined as areas with less than 40% overhead canopy cover. Highest nutritional resources are often particularly concentrated in areas with less than 20% overhead canopy cover, such as in grasslands, shrublands, and forests of the stand initiation structural stage, recognizing that nutritional resources in these areas will vary with season of elk use and forage phenology.

Elk use of forage areas often depends on their proximity to cover areas (to forest stands with overhead canopy cover 40% or higher) and the distance to roads and trails open to motorized uses. Forage areas within 100 yards of cover areas are most heavily used by elk, as are forage areas farther than 1,000 yards from roads or trails open to motorized uses. In addition, maintenance of adequate cover areas provides security for elk during hunting seasons and reduces elk vulnerability to harvest, such that harvest goals for elk can be met but not exceeded. Whether cover areas provide security for elk during hunting seasons, however, often requires motorized closures of large networks of roads and trails during hunting seasons. The need for motorized closures of many road and trail networks to provide effective security for elk during hunting seasons is higher on landscapes dominated by flat, open terrain, and lower in areas of steep, convex topography with more cover.

The sensitivity of elk to human disturbance and road management serve as an additional indicator for most other wildlife species. Gaines et al. (2003) reviewed 238 articles on the effects of recreation trails and roads on wildlife and found the most commonly reported interactions included displacement or avoidance where animals were reported as altering their use of habitats in response to roads or road networks (Cassier and Groves 1990, Hutto 1995, Johnson et al. 2000, Klein 1993, Mace et al. 1996, 1998). Disturbance at a specific site was also commonly reported and included disruption of animal nesting, breeding, or wintering areas (Linnell et al.

2000, Papouchis et al. 2001, Skagen et al. 1991). Collisions between animals and vehicles were commonly reported and affected a diversity of wildlife species, from large mammals (Gibeau and Heuer 1996, Lehnert et al. 1996) to amphibians (Ashley and Robinson 1996). Finally, edge effects associated with roads or road networks constructed within habitats, especially late-successional forests, were commonly identified (Hickman 1990, Miller et al. 1998).

### Connectivity of late seral closed forest habitats

Maintaining connectivity between habitats, particularly late and old structured habitat, is important for numerous wildlife species to allow free movement, interaction of adults, and dispersal of young. Management direction pertaining to maintaining connectivity between late and old structured (LOS) stands, in addition to designated old growth management areas (DOGMA), is provided by the Eastside Screens.

Eastside Screen direction is to maintain or enhance the current level of connectivity between LOS (OFMS/OFSS) stands and between all Forest Plan DOGMAs (MA15) by maintaining stands between them. Harvesting is permitted in connectivity corridors if canopy closures are maintained within the top one-third of site potential. Based on an interpretation made on the Forest canopy closures are considered to be within the top one-third of site potential if canopy cover is maintained at or above 40% in the dry forest PVG, and 50% in the moist forest PVG.

The current level of connectivity between MA15 and LOS stands varies across the project area due to areas of non-forested vegetation, past timber harvest, and wildfires. Stands of more contiguous forest in the northern portion of the project area are currently well connected (Maps 7 and 8, Appendix A). Major riparian areas, such as Swamp Creek and Davis Creek provide connectivity in the southern part of the project area. Pileated woodpecker, American marten and their prey, goshawk and their prey, elk, and a variety of other vertebrates and invertebrates are affected by the level of connectivity between their source or preferred habitats. This project aims to maintain connectivity, to the extent possible, between all LOS and MA15 stands within and outside the project area according to forest plan direction. See Chapter 3 for more information.

### Threatened and endangered wildlife species

Appendix E lists all proposed, threatened, endangered, and sensitive species applicable to the LJCRP area obtained from the U.S. Fish and Wildlife Service (USDI Fish and Wildlife Service 2011). No proposed or federally-listed terrestrial wildlife species were described for Wallowa County, Oregon.

### U.S. Forest Service Region 6 Sensitive wildlife species

Table 6 summarizes the Regional Forester's list of sensitive wildlife species with habitat suspected or known to be in the LJCRP area (USDA Forest Service 2011). Existing habitat conditions are summarized below. Chapter 3 includes more details and information.

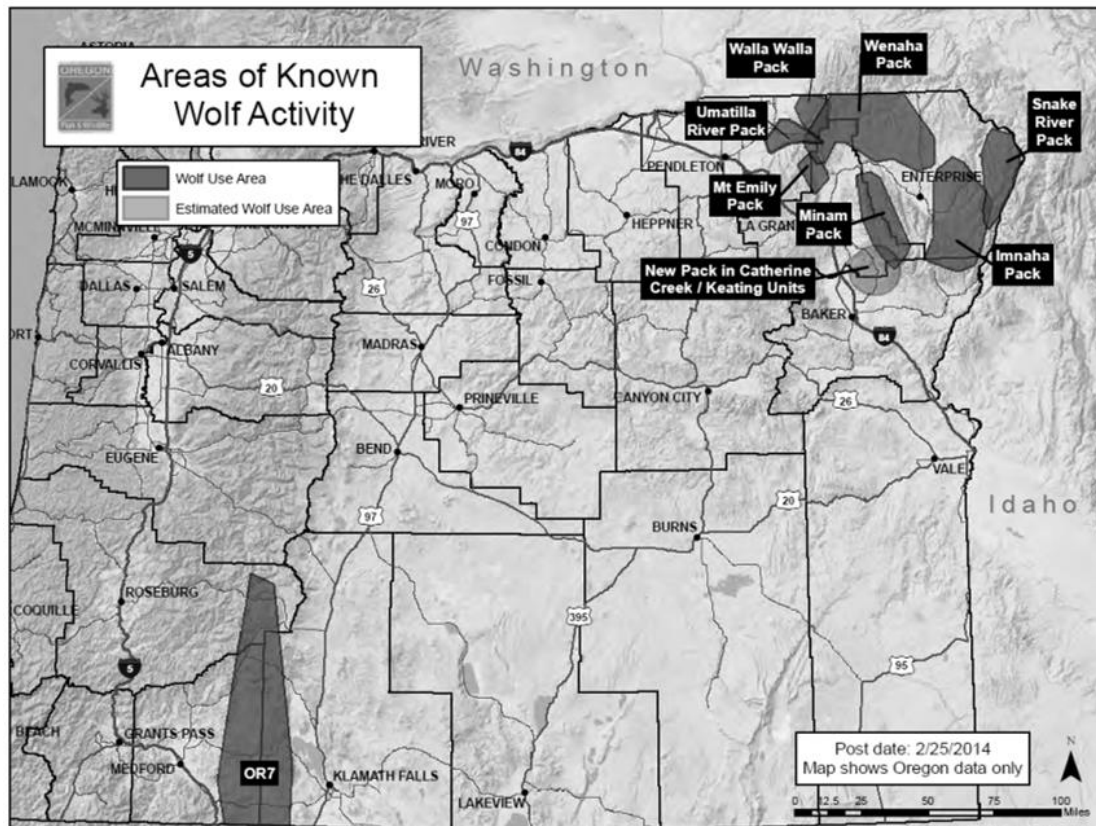
**Table 8. USDA Forest Service Region 6 Regional Forester's sensitive wildlife species with habitat suspected or known to be in the LJCRP area, and descriptions of desired conditions**

Common and latin name	Habitat within planning area <sup>1</sup>	Desired and current habitat conditions
AMPHIBIANS		
Rocky Mt tailed frog	K	Rocky Mountain Tailed Frogs ( <i>Ascaphus montanus</i> ) are primarily nocturnal, and live in fast-flowing headwater streams in old-growth forests (Nielson et al. 2001). They occur in very cold, fast-flowing streams that contain large cobble or boulder substrates, little silt, and are often darkly shaded (Bull and Carter 1996). In the LJCRP area, tailed frogs were documented in Broady, West Fork Broady, East Fork Broady, and Cottonwood Creeks during Forest Service’s stream surveys in the 1990s. Other streams that may provide habitat for tailed frogs are Peavine Creek, Rush Creek, Horse Creek, Deadhorse Creek and the Cottonwood tributary south of Deadhorse Creek. Tailed frogs are likely to occur in RHCA categories 1-3 due to the species’ need for flowing water at all times. Tailed frogs are not likely to occur in Swamp Creek, as they are found in fast flowing, cold headwater streams.
<i>Ascaphus montanus</i>		
Columbia spotted frog	P	Columbia spotted frogs are highly dependent on aquatic habitats and require permanent and semi-permanent wetlands that have aquatic vegetation and some deeper or flowing water for overwintering (Bull and Marx 2002, Pilliod et al. 2002). The spotted frog frequents waters and associated vegetated (grassy) shorelines of ponds, springs, marshes, and slow-flowing streams and appears to prefer waters with a bottom layer of dead and decaying vegetation (Bull 2005) are year-round residents of the Blue Mountains and occur in a number of locations across Northeast Oregon (Bull 2005, Reaser and Pilliod 2005). There have been no surveys specifically for spotted frogs within the LJCRP area but habitat is available and the species may exist along the perennial low gradient streams or ponds in the upper elevations.
<i>Rana luteiventris</i>		
BIRDS		
Northern bald eagle	P	Bald eagles are highly dependent on riparian habitats. Nesting territories are normally associated with lakes, reservoirs, rivers, or large streams. In the Pacific Northwest recovery area the preferred nesting habitat for bald eagles is predominately uneven-aged, mature coniferous (ponderosa pine and Douglas-fir) stands or large black cottonwood trees along a riparian corridor (NatureServe 2012(USDI, 1986 #628). No known nest sites exist within the project area. Nearest nest sites are located more than 10 miles from the project area. The project area does contain potential foraging habitat and the potential for species occurrence.
<i>Haliaeetus leucocephalus</i>		
American peregrine falcon	K	Peregrines are found in many terrestrial biomes in the Americas; none seems to be preferred (although perhaps greater densities in tundras and coastally). The most commonly occupied habitats contain cliffs, for nesting and generally open landscapes for foraging (Hayes and Buchanan 2002, Hays and Milner 2004). A source of water, such as a river, lake, marsh or marine waters is typically in close proximity to the nest site and likely is associated with an adequate prey base of small to medium sized birds (Johnsgard 1990). There is no historical data for peregrines in the LJCRP area. Potential nest sites have been identified but suitable nest ledges are limited as are larger bodies of water for prey concentrations. Though no longer listed as endangered, their numbers are still low, and managing habitat toward recovery goals is warranted.
<i>Falco peregrinus anatum</i>		
Lewis’ woodpecker	P	Three main habitats used by Lewis’ woodpecker throughout its range are burned or logged areas, open ponderosa pine savanna at high elevations, and riparian woodland dominated by large cottonwoods at low elevations (Bock 1970, Tobalske 1997, Saab and Dudley 1998, Saab
<i>Melanerpes lewis</i>		

Common and latin name	Habitat within planning area <sup>1</sup>	Desired and current habitat conditions
		and Vierling 2001, Abele et al. 2004). Currently there is very little recent post-fire habitat in the LJCRP area.
White-headed woodpecker	P	The white-headed woodpecker is associated with open-canopied ponderosa pine forests (Bull et al. 1986, Frederick and Moore 1991, Garrett et al. 1996, Kozma 2011). White-headed woodpeckers forage predominantly on large-diameter live ponderosa pine trees (Dixon 1995) with pine seeds being the most important vegetable food item in Oregon (Bull et al. 1986, Dixon 1995). In addition, these woodpeckers may use areas which have undergone various silvicultural treatments, including post-fire areas, if large-diameter ponderosa pines (alive or dead) and other old-growth components remain (Raphael 1981, Raphael and White 1984, Raphael et al. 1987, Frenzel 2002, Wightman et al. 2010). Due to fire suppression in dry upland forest habitats, many areas that historically supported this species' habitat - open stands of large diameter ponderosa pine - now support closed canopied mixed species stands that no longer provide suitable habitat for the white-headed woodpecker.
<i>Picoides albolarvatus</i>		
<b>MAMMALS</b>		
Gray wolf	K	Habitat preference for the gray wolf appears to be more prey dependent than cover dependent. The wolf is a habitat generalist inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features (Mech et al. 1988, Witmer et al. 1998, Mladenoff et al. 1999). Based on data collected by the ODFW, the Imnaha pack (approximately 15 miles east of Joseph, Oregon) and Wenaha pack (centered approximately 20 miles west of Troy, Oregon) appear to be breeding, and in the summer of 2014 a new pack (Chesnimnus pack) was documented in the project area (Figure 3). Wolves prey primarily on large ungulates such as elk and deer (Boyd et al. 1994, Fritts et al. 1994, Kunkel et al. 1999). Alternate prey typically consists of smaller mammals and birds, such as, beaver, ground squirrels, rabbits, and grouse (Boyd et al. 1994; Witmer et al. 1998). Individuals may take livestock as secondary prey when ungulates are less vulnerable or available (Witmer et al. 1998).
<i>Canis lupus</i>		
Fringed myotis	K	Fringed Myotis ( <i>Myotis thysanodes</i> ) occurs from sea level to 2,850 m but is most common at middle elevations 1200 to 2,100 m. Although the fringed myotis is found in a wide variety of habitats including desert scrub, mesic coniferous forest, grassland, and sage-grass steppe its distribution is patchy and it appears to be most common in drier woodlands (oak, pinyon-juniper, ponderosa pine). They roost in crevices in buildings, underground mines, rocks, cliff faces, and bridges. Roosting in decadent trees and snags, particularly large ones, is common throughout its range in western U. S. and Canada. The fringed myotis has been identified in the LJCRP (Anderson 1998). In general, the greatest threat to this species' habitat is human disturbance of roost sites through recreational caving and mine exploration, and disturbance of habitat (Weller 2005) (Keinath 2004).
<i>Myotis thysanodes</i>		
Townsend's big-eared bat	K	Townsend's big-eared bats have been reported from sea level to 3,300 meters in a wide variety of habitat types including coniferous forests, mixed meso-phytic forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat types (Kunz and Martin 1982, Piaggio and Sherwin 2005). Distribution is strongly correlated with the availability of caves and cave-like roosting habitat, including abandoned mines (Pierson et al. 1999, Sherwin et al. 2000, Gruver and Keinath 2006). A survey by Anderson (1998) located this bat within the Lower Joseph Watershed.
<i>Corynorhinus townsendii</i>		

Common and latin name	Habitat within planning area <sup>1</sup>	Desired and current habitat conditions
Spotted bat	P	The spotted bat has been found from below sea level to 2,700 m elevation and occurs from arid, low desert habitats to high elevation conifer forests (Chambers and Herder 2005). Prominent rock features appear to be a necessary feature for roosting. This species has been found in vegetation types that range from desert to sub-alpine meadows, including desert-scrub, pinyon-juniper woodland, ponderosa pine, mixed conifer forest, canyon bottoms, rims of cliffs, riparian areas, fields, and open pasture. Roost sites are cracks, crevices, and caves, usually high in fractured rock cliffs. As with most bat species, threats include habitat destruction or alteration, disturbance, sensitivity to pesticides and other pollutants, and overexploitation. No spotted bats have been recorded on the WWNF, however due to the lack of intensive bat sampling it is possible that the spotted bat occurs there.
<i>Euderma maculatum</i>		
INVERTEBRATES		
Johnson's hairstreak	P	These butterflies occur within coniferous forests which contain the mistletoes of the genus <i>Arceuthobium</i> , commonly referred to as dwarf mistletoe. These plants are highly specialized and are known to occur on a number of different conifers (Schmitt and Spiegel 2008). Old-growth and late successional second growth forests provide the best habitat for this butterfly, although younger forests where dwarf mistletoe is present also supports <i>C. johnsoni</i> populations (Larsen et al. 1995, Miller and Hammond 2007)LaBonte et al. 2001). Older coniferous forests, especially those with a heavy component of western hemlock ( <i>Tsuga heterophylla</i> ) that are infected by dwarf mistletoe ( <i>Arceuthobium tsugense</i> ) appear to be its key habitat (Andrews 2010, Miller and Hammond 2007, Larsen et al. 1995). In Washington, it is only know to occur west of the Cascade crest (Larsen et al. 1995). A disjunct population occurs at the Oregon/Idaho border in Baker and Union counties, Oregon and Adams County, Idaho. This disjunct population may be a relict population isolated by climate changes (Davis and Weever 2011).
<i>Callophrys johnsoni</i>		
Intermountain sulphur	P	This species inhabits open woodland from 3400 to 5000 feet, including meadows, roadsides, and open forest and is most often found on steep sunny slopes at the ecotone between forest and shrubsteppe or grassland habitats (Foltz 2009). Hammond ( <i>In Foltz 2009</i> ) describes the subspecies habitat as sagebrush with scattered Ponderosa Pine, including both south- and east-facing slopes. The larvae of this subspecies feed on <i>Lathyrus</i> species, including <i>L. brachycalix</i> , <i>L. lanzwertii</i> , <i>L. puciflorus</i> , and <i>L. nevadensis</i> (Foltz 2009). The Asotin County population in Washington was reported to feed on <i>L. puciflorus</i> ( <i>reviewed in</i> Warren 2005). Adults of <i>C. christina</i> use a variety of plants as nectar sources, and males may occasionally be seen frequenting mud puddles (Warren 2005).
<i>Colia Christina pseudochristina</i>		
Western bumblebee	P	Suitable habitat includes typically associated with sub-alpine meadows, coastlines, and high elevation valleys. It is known to feed on sweet clover, rabbit brush, thistle, buckwheat and clover (Koch et al 2011).
<i>Bombus occidentalis</i>		
Radiodiscus albietum		

1/ P = potentially occurs in LJCRP area; K = known to occur



**Figure 3: Location of gray wolf packs as depicted on Oregon Department of Fish and Wildlife web site (15 October 2014)**

### Landbird and migratory bird habitats

The loss and alteration of historic vegetation communities due to intensive timber harvesting, fire suppression, over-grazing, invasion of exotic vegetation, and human development has impacted landbird habitats and resulted in some species range reductions, population declines, and some local and regional extirpations. In December, 2008, the U.S. Fish and Wildlife Service released The Birds of Conservation Concern Report (BCC) which identifies species, subspecies, and populations of migratory and resident birds not already designated as federally threatened or endangered that represent the highest conservation priorities and are in need of additional conservation actions. Table 9 summarizes birds of conservation concern with habitat known or assumed to occur in the LJCRP area. In accordance with Executive Order 13186 (“Responsibilities of Federal Agencies to Protect Migratory Birds”), it is recommended that these lists be consulted during project planning to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions for these species. More detail can be found in Chapter 3.

**Table 9. Birds of conservation concern with known or assumed habitat in the LJCRP area.**

Common Name	Breeding Bird Survey (BBS) - declining trends <sup>1</sup>	Birds of Conservation Concern (BCC)	Forest Service Sensitive	Habitat Group 1; 2	Habitat description	Existing condition
Brown creeper	BBS (L,R)			Cool/Moist Forest;; Medium /Large Trees	In the Pacific northwest prefers late successional stages of moist coniferous forests with high canopy cover.	These habitats are currently at the low end of the RV. At the landscape scale, there is a risk to uncharacteristic fire which would remove habitat for this species.
Cassin's Finch		BCC		All Forest Communities; Medium /Large Trees	Open, mature coniferous forests of lodgepole and ponderosa pine, aspen, alpine fir, grand fir and juniper steppe woodlands	Medium/large tree habitat (>15" dbh) is overall within the RV. In relation to the RV, moist forests are low in closed canopied conditions, while dry forests are low in open canopied conditions. Large snag density is below the RV in moist forests. Shrubby understory habitats may be suppressed particularly in the dry forests. At the landscape scale, there is a risk to uncharacteristic wildfire; these species would likely respond negatively to wildfire depending on the intensity.
Williamson's Sapsucker		BCC			E. Cascades, mid to high elevation, mature open and mixed coniferous - deciduous forests. Snags are a critical component.	
Mountain chickadee	BBS '(R)				Occurs in coniferous forests. Forage high in the canopy and in larger trees.	
Ruffed Grouse	BBS (L)				Mosaics of dense cover and openings, riparian areas.	
White-headed Woodpecker		BCC	Sensitive	Dry Forest ; Medium /Large	Nesting habitat consists of open-canopy stands with mature and overmature ponderosa pine.	Habitats for these species are below the RV. At the landscape scale, there is a risk to uncharacteristic wildfire. A mixed severity fire may create source habitat for white-headed woodpeckers.
Flammulated Owl		BCC			Associated with ponderosa pine forests and mixed conifer stands with an open canopy, open understory with dense patches of saplings or	

Common Name	Breeding Bird Survey (BBS) - declining trends <sup>1</sup>	Bids of Conservation Concern (BCC)	Forest Service Sensitive	Habitat Group 1; 2	Habitat description	Existing condition
					shrubs.	
Calliope hummingbird	BBS ('R)	BCC		All Forest Communities ; Open Forest	Predominantly a montane species found in open shrub sapling seral stages (8-15 years) at higher elevations and riparian areas.	In relation to the RV, moist forests with medium and large trees and forests of early structure (<10") is low in the abundance of open canopied forests. Open-canopied habitats in dry forests are all below the RV. At the landscape scale there is a risk to uncharacteristic wildfire or disturbance would remain high. Lower intensity disturbance, may provide habitat for some of these species, especially the Townsend's solitaire.
Townsend's solitaire	BBS ('R)				Breeds in and near open coniferous forest stands, natural forest openings, burned areas, shelterwood cuts and clearcuts.	
Dark-eyed junco	BBS ('R)				Forages and nests on or close to the ground and is associated with forest openings and patches of early seral vegetation.	
American kestrel	BBS ('R)			Post-Fire Habitat; Open Forest	Wide variety of open to semiopen habitats, including meadows, grasslands, deserts, early successional communities, open parkland, agricultural fields. Suitable nest trees and perches required.	Post-fire habitat is currently below the RV. Under Alt. 1 source habitat abundance would not be changed. At the landscape scale the risk to uncharacteristic wildfire or disturbance would remain high. High and moderate intensity/scale wildfire would likely increase habitat for these species.
Olive-sided flycatcher	BBS (L)	BCC			Open conifer forests (< 40 % canopy cover) and edge habitats where standing snags and scattered tall trees remain after a disturbance.	

Common Name	Breeding Bird Survey (BBS) - declining trends <sup>1</sup>	Bids of Conservation Concern (BCC)	Forest Service Sensitive	Habitat Group 1; 2	Habitat description	Existing condition
Lewis's Woodpecker		BCC	Sensitive		Primary habitats include open ponderosa pine, riparian cottonwood, and logged or burned pine.	
Peregrine Falcon		BCC	Sensitive	Habitat Generalist; Human Disturbance	Wide range of habitats, nests on cliff ledges, bridges, quarries. Suitable nesting habitat consists of cliffs, usually within 900 meters of water (Pagel 1995)	Human disturbance is likely the most important factor affecting this species.
Ferruginous Hawk		BCC		Woodland/Grass/Shrub; Grassland	Occupy habitats with low tree densities and topographic relief in sagebrush plains of the high desert and bunchgrass prairies in the Blue Mtns.	The quality of these habitats are changed from historical primarily due to grazing, invasive species, fire suppression. Depending the scale and intensity of a wildfire, the quality of these habitats could be improved or reduced.
Mourning dove	BBS (L)				Habitats range within open forests and clearcuts, grass, shrub, juniper-steppe, agriculture and agricultural areas.	
Black-billed magpie	BBS (L)				Habitats typified by open country, ranch and agricultural lands, juniper woodlands, sagebrush steppe, and open meadows and riparian thickets.	
Swainson's Hawk		BCC			Found in open country with no need for numerous trees prefer prairies and irrigated farmland	

Common Name	Breeding Bird Survey (BBS) - declining trends <sup>1</sup>	Bids of Conservation Concern (BCC)	Forest Service Sensitive	Habitat Group 1; 2	Habitat description	Existing condition
					with high prey densities.	
Killdeer	BBS ('R)				Open areas with short and/or sparse vegetation or bare ground.	
Black Swift		BCC	Sensitive	Riparian ; Waterfall	Nests on ledges or shallow caves in steep rock faces and canyons, usually near or behind waterfalls and sea caves. Forage over forests and open areas in montane habitats.	Particularly in dry forests, canopy closure is above the RV and may be suppressing shrub development in some riparian areas. At the landscape scale there is a risk to uncharacteristic fire. Likely, in the short-term following a wildfire, habitat for these species would be reduced. In the longer-term wildfire may increase shrubs and habitats for some of these species.
Bald Eagle		BCC	Sensitive	Riparian ; Riparian /lg tree or snag/open water	Associated with large bodies of water, forested areas near the ocean, along rivers, and at estuaries, lakes and reservoirs.	
Willow Flycatcher		BCC			Associated with riparian shrub dominated habitats, especially brushy/willow thickets. In SE WA also found in xeric brushy uplands.	
Red-eyed vireo	BBS(L,R)			Riparian ; Shrubby /Deciduous Riparian	Riparian forests consisting of large black cottonwood, or other deciduous species with understories of chokecherry, willow, alder, hawthorn, and hackberry.	
Yellow warbler	BBS (L)				Riparian woodlands particularly those dominated by willow or cottonwood,	

Common Name	Breeding Bird Survey (BBS) - declining trends <sup>1</sup>	Bids of Conservation Concern (BCC)	Forest Service Sensitive	Habitat Group 1; 2	Habitat description	Existing condition
Barn swallow	BBS ('R)				Breeding habitat usually contains open areas (fields, meadows) for foraging, nest site that includes a vertical or horizontal substrate (often enclosed) underneath some type of roof or ceiling, and a body of water that provides mud for nest-building	
Common snipe	BBS ('R)			Wetland ; Marsh/ Wet Meadow	Wet meadows, marshes, of sedge or grass, cattail marsh edges or riparian bogs.	

<sup>1</sup>/ L= long-term trend (1966-1998); R= recent trend (1980 – 1998)

Management actions needed to reduce departure between current and desired wildlife habitat for MIS, landbirds, and, sensitive species include thinning of dense forest stands toward desired conditions to ensure their continued resistance to stand replacement disturbances (wildfire; insect and disease outbreaks), and protection of existing old forest habitat. Other management actions needed to restore forage quality include the reintroduction of fire, redistribution of domestic livestock, and invasive plant species eradication.

## Watershed, Riparian, and Aquatic Habitat

The state of the physical and biological characteristics and processes within a watershed affect the soil and hydrologic functions supporting aquatic ecosystems. Watershed condition reflects a range of variability from naturally pristine (functioning properly) to degraded (severely altered state or impaired). Watersheds that are functioning properly have terrestrial, riparian, and aquatic ecosystems that capture, store, and release water, sediment, wood, and nutrients within their range of natural variability for these processes (USDA Forest Service 2011b). Specific desired conditions for watershed and aquatic systems are based on Forest Plan guidance, as amended by PACFISH, other policy guidance, state and federal standards, literature reviews, and Watershed Condition Framework definitions of properly functioning watersheds (USDA Forest Service 2011a).

Table 1 compares existing and desired conditions for riparian management objectives (RMOs) for the LJCRP. Landscape-scale interim RMOs describing good habitat for anadromous fish at the watershed scale were developed using stream inventory data for pool frequency, large woody debris, bank stability, and width to depth ratio. State water quality standards were used to define

favorable water temperatures. These RMOs are stream centric and do not reflect vegetation RMOs for all RHCAs and the streams within them. RMOs are summarized in Table 10.

**Table 10. Riparian Management Objectives for the LJCRP.**

<b>Pool Frequency:</b> (varies by wetted width)								
<b>Wetted width in feet:</b>	10	20	25	50	75	100	125	150
<b>Number of pools/mile:</b>	96	56	47	26	23	18	14	12
<b>Water Temperature:</b>	Compliance with state water quality standards, or maximum <68F							
<b>Large Woody debris:</b>	> 20 pieces per mile; >12 inches diameter; 35 foot length							
<b>Bank Stability:</b>	>90 percent stable							
<b>Width/Depth Ratio:</b>	<10, mean wetted width divided by mean depth							

Chapter 3 provides more detail about the affected environment in terms of riparian management objectives, and sediment delivery to streams for the LJCRP.

In general, vegetative conditions in the RHCAs (management areas defined by a set distance from a stream bank or floodplain) reflect the general departure from HRV across the planning area.

For Category 1 and 2 streams the desired condition is for well stocked, closed canopy conditions. This desired condition allows for attainment of RMOs for stream temperature, large wood debris recruitment, which will maintain pool habitat values, and limit sediment delivery to stream channels. In some cases the stream will not be in a forested vegetation type but in a meadow vegetation type that would be described as a grass forb community with little coniferous vegetation and limited woody vegetation.

For Category 4 streams the desired conditions is for a vegetation condition that provides for generally similar forest structure and composition as the upland forest vegetation. Olson (2000) found fire occurrence in riparian zones to be only slightly less frequent than on adjacent uplands in similar forest types in the Blue Mountains in Oregon (Wright and Agee 2004).

This desired condition allows for the attainment of RMOs for large woody debris recruitment and limiting sediment delivery to stream channels and storing sediment in the channel to delay delivery downstream to fish bearing streams.

## Socioeconomics

Agriculture, forestry, fishing and hunting; government; and retail trade sectors contain the largest shares of employment in Wallowa County. In addition, logging jobs make up two percent of total employment in Wallowa County (Minnesota IMPLAN Group 2014). Wallowa County holds about one percent of the jobs in the logging sector for the state of Oregon. Of the approximate 8,500 jobs in the logging sector in Oregon, 97 of those jobs are located in Wallowa County. Employment in the wood manufacturing sector only accounts for 16 jobs in Wallowa County, or 0.1 percent of the wood manufacturing jobs in the state. Although the logging sector makes up about two percent of total jobs in Wallowa County, this sector contains 6.5 percent of total labor income because the average wage per job in the logging sector was \$62,000 in 2012.

The public meeting that was held in Enterprise, Oregon (see “Public involvement” section) as well as the submitted written comments provided insight into the values, beliefs, and attitudes of the Lower Joseph Creek area residents and surrounding communities. The major concerns from the commenters were focused on economic, cultural and biological values, with specific beliefs regarding roads and access, vegetation treatments, cultural and tribal resources, and recreation, among others.

From the 1950’s until 1992 the annual harvest from NFS land in Wallowa County averaged 50 to 100 million board feet year, the highest in 1962 of 129 million board feet. Since 2000, the saw timber volume harvested from NFS lands in Wallowa is between 0 and 10 million board feet per year with an average harvest of less than 5 million board feet per year (Wallowa County 2014).

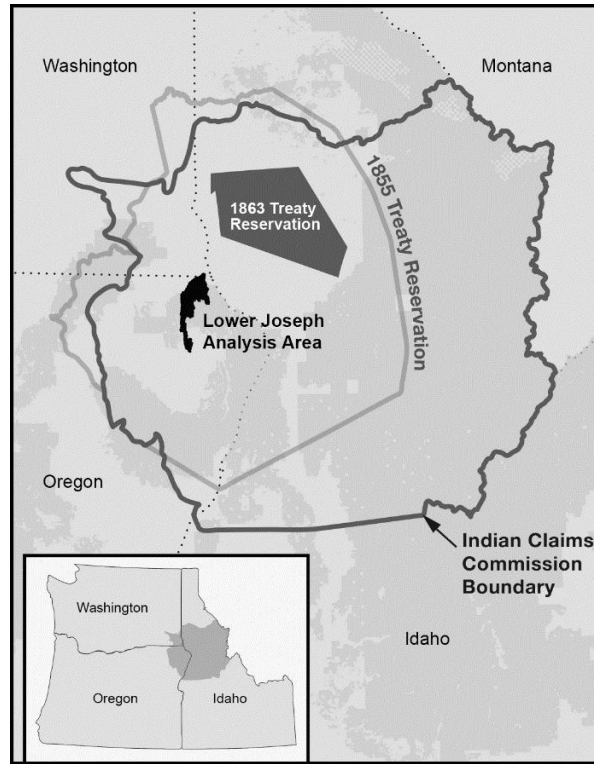
## **Tribal relations**

The aboriginal territory of the Nez Perce Tribe, also known as Nimiipúu, or “the people”, includes large portions of the States of Idaho, Washington, Oregon, Montana and Wyoming (Figure 4). Through time and tradition, the Tribe has acquired and applied traditional ecological knowledge, as well as the latest science, to design and implement tribal stewardship objectives (Sondenaa and Kozusko 2003b, Nez Perce Tribe 2013). The Chief Joseph Band of Nez Perce had their winter home within Joseph Canyon.

The Nez Perce way of life, now as in the past, depends on the inherent right of tribal members to fish, hunt, gather, pasture animals and rely on the land for subsistence as well as sanctuary. Article III of the Treaty of 1855 provides for: “The exclusive right of taking fish in all the streams where running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privileges of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land”(Treaty of 1855, 12 Stat, 957).

The exercise of treaty rights is dependent upon access to traditional hunting, fishing, and gathering sites and the resources associated with them. Sustainable populations of treaty resources such as fish, wildlife, and traditional plants, depend upon healthy habitats and resilient landscapes. Land management decisions may affect the ecosystems wherein valued tribal resources and natural settings are dependent. Refer to the plants, wildlife, fisheries and watershed sections of this DEIS, and specialist reports for complete analyses for these resources.

The purpose and need for the LJCRP is not directly driven by Tribal interests. However, tribal comments conveyed substantive concern for the protection of treaty and heritage resources.



**Figure 4. Nez Perce aboriginal territory (Indian Claims Commission boundary) and 1855 and 1863 treaty land cessions (Adapted from Nez Perce 2013)**

In the LJCRP, Nez Perce tribal members:

- Exercise Treaty rights to hunt, fish and gather subsistence resources including access to sites for camping and other traditional uses. In the LJCRP traditional plant habitats, including scab lands, meadows, riparian areas and seeps are being encroached upon by over stocked forests resulting from fire exclusion. The historically open fire dependent ecosystem that functioned to provide healthy habitat for subsistence resources, is becoming less resilient to disturbance, insects, and disease.
- Are stewards in the management and recovery of steelhead and salmon populations in the Lower Joseph Creek watershed.
- Conduct Neotropical bird studies adjacent to the LJCRP.
- Manage for wildlife values in their Precious Lands Management Area located adjacent to the LJCRP
- Travel to the LJCRP area to continue traditional practices. Information regarding the locations and activities associated with these practices are private and not readily shared. The Forest continues to work toward building relationships with the Tribe, tribal staff and members so that the potential effects to the settings and values associated with access and the use of traditional places may be understood and addressed.

## Heritage resources

Heritage resources, also known as cultural resources, archaeological, ethnographic and traditional sites or places, are highly valued by the public and Tribes as they are non-renewable

vestiges of our Nation's heritage. The Forest Service is responsible for the management of heritage resources located on NFS lands. Also see the policy, legal, social and economic constraints section in Chapter 1.

The archaeological and historic sites located in the LJCRP area tell a robust story of early human uses, culture and lifeway associated with this landscape (Wallowa County 2014).

## Cultural Resource Site Types in the LJCRP

### *Pre-contact to Euro American settlement (up to 1870)*

Tool stone quarries and lithic scatters originating from local granite and andesite outcrops are the most common archaeological site type in the LJCRP. Archaeological excavation of a quarry site located within the LJCRP area yielded evidence of aboriginal use and occupation dating from 8000 years ago into the pre-contact era (18 century). In addition, sites associated with the Nez Perce (or Sahaptin speakers) seasonal subsistence ground include cambium peeled trees, upland plant processing camps and hunting camps. Rock features associated with ancient traditional practices have also been recorded.

### *Early settlement to (1870-1940)*

Cabins, barns, troughs, and fencing materials associated with trapping, homesteading and ranching are the most represented historic resources in the LJCRP area. Railroad logging camps, grades tresses and Civilian Conservation Corps Forest Service guard stations, lookouts, phone lines, and pack trails are also well represented.

Desired conditions as set forth in the WWNF plan states that the goal for heritage resources is to “provide for the identification, protection, preservation, enhancement and interpretation of prehistoric and historic sites, buildings, objects, and antiquities of local, regional or National significance so as to preserve their historical, cultural, and scientific values for the benefit of the public” (4-20). This goal and associated standards and guidelines are also found in the Hells Canyon NRA Comprehensive Management Plan HCNRA CMP; See Appendix B for relevant standards and guidelines).

## Research Natural Areas

Research Natural Areas (RNA) are designated for research and educational opportunities, to maintain biological diversity on NFS lands, and are selected to complete a national network of ecological areas. Horse Pasture Ridge and Haystack Rock were originally proposed for RNA designation in 1988, and they still maintain all the qualities unique for RNA designation. The Horse Pasture Ridge proposed area would contribute to the national network of RNAs by providing an example of Idaho fescue-prairie junegrass and Idaho fescue–bluebunch wheatgrass plant associations in ridge top communities. The Haystack Rock proposed area would contribute to the national network of RNAs by providing an example of Idaho fescue-bluebunch wheatgrass-arrowleaf balsamroot and bluebunch wheatgrass-Sandberg's bluegrass-narrow-leaved skullcap plant associations. More information on these proposed RNAs can be found in Chapter 3.

## Modified Proposed Action (Alternative 2)

Modifications to the proposed action occurred in the time between scoping and issuing this DEIS as a result of public comments or analyses that relate specifically to standards and guides found

in the respective Forest Plans for the Wallowa Whitman National Forest or the Hells Canyon National Recreation Area. See “Changes to the proposed action since scoping” below. The Modified Proposed Action is analyzed in detail in this DEIS; and unless otherwise noted (e.g., Table 13), is synonymous with the term “proposed action”.

The Forest Service proposes to implement activities across the approximately 98,600 acre LJCRP area to meet the purpose and need. Silviculture treatments would provide a diversity of forest structures that are more in line with desired conditions, and more resilient to anticipated future environmental conditions. Forest thinning prescriptions would follow a practical, science based approach intended to restore characteristic functionality, and resistance and resilience to disturbance. Known as “ICO” (individuals, clumps and openings), this approach uses historical information at the stand- and landscape-level to design restoration strategies and prescriptions for restoration (e.g., see (Franklin et al. 2013a)). For example, the pattern of old trees, stumps and snags currently on the landscape provide indicators of natural tree clumping and spacing, and thus the degree of horizontal spatial heterogeneity. In places where legacies of historic forest patterns are absent (e.g., young, post-fire forests), information is used from similar habitats.

Thinning, and mechanical fuel treatments across approximately 16,700 acres would encourage the development of large tree structural characteristics, understory plant diversity, forage productivity, and resilience to disturbances such as wildfire. Thinning of largely younger trees across an additional 5,500 acres, which are in the process of recovery after stand replacement disturbance, would encourage the development of spatial heterogeneity and increase the proportion of early seral tree species. Silvicultural treatments would generally retain and protect large trees of early seral species and trees with old growth physical characteristics consistent with historical reference conditions.

Silvicultural treatments in category 4 RHCAs (intermittent, non-fish bearing streams) would be applied where they support attainment of RMOs, and would generally parallel adjacent upland treatments. Category 4 RHCAs identified for treatment would include the establishment of a minimum 25 foot variable width buffer where, unlike treatments within category 4 RHCAs outside buffers, there would be no harvest or equipment allowed. RHCAs will be treated in accordance with the Blue Mountains Project Design Criteria in regards to non-mechanized treatments such as non-commercial hand thinning and prescribed fire.

No treatments would occur in categories 1, 2 or 3 RHCAs, with the exception of Swamp Creek (Category 1 RHCA), or any RHCAs that are currently in an old forest structural condition. Treatment in Swamp Creek includes thinning of encroaching trees to restore meadow features, hydrologic function, and aquatic habitat conditions. Removal of woody vegetation encroachment resulting from fire exclusion in some riparian areas would protect and restore watershed function. Riparian and flood plain restoration may also include road closure or modification. Silvicultural treatments in Category 4 RHCAs (intermittent, non-fish bearing streams) would only be applied where they support attainment of RMOs, and would generally parallel adjacent upland treatments. Category 4 RHCAs identified for treatment would include the establishment of a 25 foot variable width buffer where there would be no harvest or equipment allowed. RHCAs will be treated in accordance with the Blue Mountains Project Design Criteria in regards to non-mechanized treatments such as non-commercial hand thinning and prescribed fire. Since no single tree selection or group selection would be prescribed in MA15, no trees >21” in diameter would be harvested in MA 15.

Prescribed burning using planned and unplanned ignitions of natural fuels, where ecologically appropriate, on up to 90,000 acres, would reduce fuel loads, increase understory productivity and

diversity, allow fire to perform its natural ecological role, and reduce uncharacteristic disturbance from wildfire, insects, and disease.

The transportation system would be managed through road reconstruction, use of temporary roads, and seasonal or permanent closures, as needed to support public access, proposed forest management activities, wildlife habitat quality, and aquatic habitat connectivity. The majority of road-related activities would make use of the existing system road network. A roads analysis will be conducted to assess the transportation system and the appropriate actions needed to meet project and administrative needs, public access, forest plan standards and guidelines, future needs, and consultation guidance for federally listed fish. Approximately 86 miles of system road would be reconstructed; and 12.6 miles of temporary roads would be constructed. Of the roads that have already been identified for seasonal or permanent closure under past decisions, or that have been naturally closed, 16 miles would be closed, and approximately 25 miles would be decommissioned, as determined in the roads analysis and an evaluation of each segment's status, future need, and impact on other resources. Roads proposed for any type of closure will focus on restoring water quality, fish habitat and wildlife habitat.

In the interest of landscape learning and streamlining NEPA, two Research Natural Areas, which have been proposed for establishment in the WWNF forest plan (Horse Pasture Ridge (338 acres) and Haystack Rock (425 acres)) would be established and serve as untreated baseline study areas. The establishment of the two RNAs would require a forest plan amendment, as described below.

The proposed action would include maintenance and enhancement of culturally significant resources, settings, viewsheds, and sensitive plant and animal species habitat, including those of interest to the Tribes. A monitoring strategy would be developed to support adapting management strategies and sharing lessons learned through time. Input from interested parties and the most current, applicable science will be used to guide this monitoring.

Connected actions that would be included in the analysis include road maintenance, and hazard tree cutting or removal. Fuels associated with silvicultural treatments (activity fuels) would be treated with a suite of available tools including, but not limited to, mastication, removal, grapple or hand pile and burn, cutting and scattering limbs, or prescribed fire.

Project design elements and site specific mitigation measures would be developed during the analysis of individual activity areas to reduce or eliminate unwanted effects, including those affecting tribal resources and cultural values. Mitigation measures may include seasonal operating restrictions, snag creation, and/or soil amendments (e.g., adding biochar) on compacted or detrimental soils.

### **Forest Plan Amendments – Alternative 2 (Modified Proposed Action)**

The Forest Service proposes amending the Wallowa Whitman Land and Resource Management Plan (forest plan) under the 1982 planning regulations following Forest Service Handbook (FSH 1909.12 section 25.4) and Manual direction (FSM 1926.51) direction. The following forest plan amendments would be needed to implement the Modified Proposed Action.

#### ***Wildlife habitat***

1. Wildlife Standard (The Eastside Screens – Regional Forester's Amendment # 2 for the Wallowa-Whitman Land and Resource Management Plan (forest plan)). The forest plan would need to be amended on 7,466 acres within the LJCRP area to allow for the removal of trees

greater than 21" in diameter at breast height (dbh). The design of prescriptions for cutting of any trees >21" would be based on the desire to restore forest structure and composition toward reference conditions (HRV), particularly to increase the abundance of shade-intolerant tree species (ponderosa pine and western larch), reduce the risk of uncharacteristically severe fire and insect and disease outbreaks, and increase resiliency to natural disturbance and climate change. With the intent to conserve all old trees, the project would adopt scientifically-derived guidelines, such as the "Van Pelt guidelines" (2008), to assess tree age regardless of the diameter of individual trees.

The Eastside Screens were adopted as interim direction in 1993 (see the "Policy, legal, social and economic constraints on the decision space" section above). In 2003, after 10 years of implementation, the Regional Forester for the Pacific Northwest Region examined whether the Eastside Screens were functioning as intended (Goodman 2003). It was found that interpretation of screens direction, including 21-inch diameter limitations, no harvest in stands below HRV, and prescriptive connectivity corridors, at times limits the ability to meet policy objectives of providing late, old forest structure (LOS), particularly in dry single-story ponderosa pine or western larch stands. Restoring species composition towards HRV can at times require removing larger, but younger (<150 year) shade-tolerant species to favor shade-intolerant species such as ponderosa pine and western larch. With every year that goes by without the benefits of characteristic fire or other disturbances, trees that established prior to the mid-1800s are getting larger in diameter. Hard diameter limits, such as a 21-inch dbh limit, can make it difficult to achieve desired composition in at least dry and possibly also mixed conifer forests, and compromise their future resilience (Franklin et al. 2013a, Stine In Press, 2014). Hard diameter limits, such as a 21-inch dbh limit, can make it difficult to achieve desired composition in at least dry, and possibly also mixed conifer forests, and compromise their future resilience (Franklin et al. 2013a). Site-specific forest plan amendments are used to better meet objectives for moving landscapes towards HRV, and providing for the habitat needs of associated wildlife species. The amendment would authorize two actions:

- a) Some of the large, but young, Douglas-fir, grand fir, and lodgepole pine trees that are  $\geq 21$  inches dbh, but less than 150 years in age (at breast height), would be removed from any of the structural stages being treated, except for units classified as the old forest single stratum structural stage (OFSS; this stage is called "single stratum with large trees" in the Screens). Identification of the large but young Douglas-fir and grand fir trees to be removed would be based on the need to restore the HRV in stand pattern and characteristic fire regime dynamics (more information on this rationale is below). Table 60 (Chapter 3, effects common to all action alternatives) summarizes proposed treatments by stand density class.
- b) Thinning treatments would occur in OFSS, which is below HRV, but thinning would only remove trees < 21 inches dbh, and there would be no net loss of late-old structure following the treatment (e.g., the units classified as OFSS structure before treatment, would also be classified as OFSS structure after treatment).

#### *Rationale for Removing Trees Greater Than 21-inches in Diameter*

The option to remove some of the young grand fir and Douglas-fir trees that are over 21" in diameter and interacting with a desirable tree refers to young but large grand fir and Douglas-fir trees (e.g., those grand fir and Douglas-fir trees < 150 years of age and  $\geq 21$  inches dbh) and generally competing with a desirable tree. A desirable tree is defined as those trees whose retention will contribute to the purpose and need for the LJCRP. Desirable trees occur in the following species preference (from most desirable to least desirable): any live tree  $\geq 21$  inches

dbh and > 150 years of age, ponderosa pine, western larch, Douglas-fir, [Engelmann spruce], grand fir, [lodgepole pine], and western juniper; on dry-forest sites, the tree species in brackets are uncommon and typically associated only with seeps and other moist microsites. A desirable tree also possesses a vigor level, and a lack of insect or disease activity, suggesting it could survive for at least 10 more years.

Occasionally, a desirable tree is > 150 years of age but < 21" dbh. For some of these situations, young but large grand fir and Douglas-fir trees (e.g., those grand fir and Douglas-fir trees < 150 years of age and  $\geq 21$  inches dbh) would be cut and removed when competing or otherwise threatening a desirable tree greater than 150 years of age, but less than 21 inches in diameter.

Because this portion of the proposed plan amendment would not result in all of the young but large grand fir and Douglas-fir trees being removed, a decision about which of the young but large grand fir or Douglas-fir trees to remove will incorporate wildlife considerations, and these considerations will be incorporated in the marking guides being used by crews preparing the LJCRP.

Franklin et al. (2013) provides practical guidance on restoration of dry forest structure and composition, including where larger, but younger shade-tolerant species abundance is contributing to departure from HRV.

#### *Rationale for Proposing Thinning Treatments in the OFSS Structural Stage*

Scenario A of the Eastside Screens wildlife standard allows timber harvest activity in LOS under two circumstances:

1. To transform some portion of an LOS component that is within or above HRV into an LOS component that is deficient (e.g., transforming old forest multi-story stands into old forest single story).
2. To maintain or enhance existing conditions in LOS stands within or above HRV.

The LJCRP proposed action includes about 1,478 acres of treatment designed to transform old forest multi-story conditions (which is above HRV in the project area), into old forest single story, which is below HRV (see the existing and desired conditions for vegetation, above). The proposed action includes 31 acres of thinning in old forest single story conditions (out of a total 224 acres) to maintain or enhance existing conditions. According to the Eastside Screens Scenario A, this objective is permissible for old forest multi-story conditions because it is within HRV, but it is not permissible for old forest single story conditions because abundance of this structure is below HRV. Therefore, a forest plan amendment is needed to accomplish this objective. This treatment would not change the overall LOS structural conditions. Therefore, this proposed treatment meets the intent of Scenario A because there will be no net loss of LOS as a result of proposed treatments. The understory thinning treatments proposed for these stands are designed to address species composition, stand density, insect susceptibility, climate change adaptation, and fire risk considerations. Specifically, they are designed to:

1. Improve tree vigor, and resistance to western pine beetle attack and future wildfire risk (see Chapter 3), thereby ensuring maintenance and persistence of the large-tree component into the future. Reestablishing a large-tree component would also increase resiliency to climate change, and the safety and effectiveness of prescribed fire applications.
2. Contribute to species composition objectives for the LJCRP. Of the 31 acres of proposed treatments in OFSS condition in the proposed action, about 23 acres occurs in stands with a

ponderosa pine (PP) cover type (PP is below HRV); the remaining 8 acres occurs in stands with a Douglas-fir (DF) cover type (DF is above HRV) (Table 25). The ponderosa pine treatments are designed to maintain ponderosa pine as the dominant cover type, whereas the Douglas-fir treatments are designed to convert Douglas-fir to a ponderosa pine cover type, thereby moving the landscape toward HRV.

3. Contribute to stand density objectives for the LJCRP. The entire 31 acres of proposed treatment in OFSS are designed to reduce density to low stand density. Low stand density is substantially below HRV (Table 27). In areas with wildlife habitat connectivity objectives, treatments would ensure maintenance of cover objectives.

2. The forest plan in some areas would need to be amended, if necessary, to allow tree harvests that restore old growth characteristics, natural ecological processes, or habitat for old growth dependent species in Old Growth Preserves (Forest Plan Management Area 15).

### *Research Natural Areas*

The WWNF forest plan included analysis of, and recommendations for, the establishment of the proposed RNAs evaluated in this DEIS. As part of the establishment records (FSM 4063), a forest plan amendment would need to be prepared to change designation of the Horse Pasture Ridge and Haystack Rock “proposed” research natural areas (RNA) to “established” RNAs..

### **Changes to the proposed action since scoping**

The original forest vegetation treatment acre estimates in the proposed action published in the federal register on January 9, 2014 were potential treatment acres based on the units documented in the Wallowa County watershed assessment (Wallowa County 2014), plus stand improvement acres identified by the Forest Service interdisciplinary team. The original road network treatments were based on needs identified in existing decision documents. Since then, the team has:

- Mapped the RHCAs, and determined needs to meet riparian management objectives
- Completed a preliminary plan for logging systems
- Completed a wildlife habitat assessment
- Completed an old forest connectivity assessment
- Corrected minor errors to the database in terms of potential vegetation group, cover type, structure and density class.
- Completed a roads analysis

All of these items caused the potential forest treatment acres to be reduced to those described in this DEIS. The roads analysis identified additional road treatments that would be needed to move the landscape closer to forest plan standards for wildlife habitat as they relate to open road density.

## **Decision Framework**

The proposed action and action alternatives are designed to achieve the project purpose and need, generally within the current constraints of accelerated restoration, policies, laws, regulations, and available resources. However, where necessary, the project decision could result

in amendment of the WWNF Forest Plan. This decision will not preclude subsequent decisions designed to complement this project, or fill gaps in achievement of comprehensive ecological restoration, or other goals and objectives.

The WWNF Supervisor is the Forest Service official responsible for deciding whether to select the actions as proposed (Alternative 2), select one of the other action alternatives, select an alternative that combines attributes from the alternatives or another variation, or, select no action (Alternative 1). The decision includes determining: (1) the location and treatment methods for restoration activities; (2) design criteria, mitigation, and monitoring requirements; (3) the components that will be included in the monitoring and adaptive management plan; (4) the components that will be included in the implementation checklist and plan; (5) the estimated products or timber volume to make available from the project; and (6) whether the forest plan will be amended. The PNW Research Station Director must concur with a decision to establish Research Natural Areas.

## Public Involvement

The Notice of Intent (NOI) was published in the Federal Register on January 9, 2014, and a legal notice of the comment period was published in the newspaper of record (Baker City Herald). The NOI asked for public comment on the proposal from January 9-February 10, 2014. In addition, as part of the public involvement process, the agency made presentations at collaborative and other public meetings, public workshops, and field trips. A coalition of five place-based collaboratives<sup>3</sup> met in July 2013 in Baker City, Oregon to help assess the strengths and weaknesses of potential projects to be undertaken by the ERS interdisciplinary team, including the LJCRP. For more information, see the analysis of public scoping in the project record. A number of public meetings organized by the Wallowa Whitman Forest Restoration Collaborative in February, April, and May 2014 in-part focused on scoping results, methodologies used in alternative development, and effects analyses. A public field trip was held in the project area in June 2014.

Using the comments from the public, Wallowa County, other agencies, and the Nez Perce Tribe (see *Issues* section), the interdisciplinary team developed a list of issues to address.

A public open house will be held during the formal comment period for the DEIS.

## Issues

The Forest Service separated the issues into two groups: significant and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec.

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<sup>3</sup> Collaborative groups working with the Forest Service on land management projects and issues in the Blue Mountains include the Wallowa-Whitman Forest Collaborative, Umatilla Forest Collaborative Group, Harney County Forest Restoration Collaborative, Blue Mountain Forest Partnership, and Ochoco Forest Restoration Collaborative.

1506.3)...”. A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the project record. Also see “other considerations”, in Chapter 2.

As for significant issues, the Forest Service identified the following issues during scoping:

1. There is disagreement about the best network of roads that will allow for recreation, harvesting forest products, fire management, accessing private inholdings, administration, and other uses, while also reducing or eliminating the adverse impacts that roads may have on forest and riparian resources.
2. There is disagreement about which vegetation treatments will best restore forest structure and composition toward HRV. In particular, there is disagreement about the size and species of trees to retain or harvest, and how to best minimize impacts from harvest and prescribed burning on forest and riparian resources.
3. There is disagreement about which types of forest management is needed, if any in Old Growth Preservation areas (Management Area 15), inventoried roadless areas, and potential wilderness areas (PWAs) to move toward HRV.

## **Chapter 2. Alternatives, Including the Proposed Action**

### **Introduction**

This chapter describes and compares the alternatives considered for the LJCRP. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (i.e., helicopter logging versus the use of skid trails) and some of the information is based upon the environmental, social and economic effects of implementing each alternative (i.e., the amount of erosion caused by helicopter logging versus skidding).

### **Alternative Development Process**

Alternatives for this project were designed to provide a range of possible actions. Vegetation and road treatment designs were designed to address the purpose and need, and forest plan amendments were proposed where necessary to meet the purpose and need. The USFS in coordination with Wallowa County, and the Nez Perce Tribe developed the range of alternatives, project design features, and mitigation measures presented in this chapter based on the purpose and need for action and key issues described in chapter 1. Forest plan goals and objectives, standards and guidelines, requirements under the Endangered Species Act and other Federal and state laws and regulations also influenced the development of alternatives. In total, seven alternatives were considered, four were eliminated from detailed study and three were analyzed in detail. The ID team recommended, and the responsible official approved two action alternatives and a no action alternative.

All of the LJCRP alternatives are consistent with the 1990 WWNF forest plan, as amended, applicable Forest Service manuals and handbooks, the National Forest Management Act of 1976, and the Hells Canyon NRA Comprehensive Management Plan (HCNRA CMP, 1996). All proposed fuel treatments (prescribed fire and preparation and treatment of activity fuels) are consistent with Forest Plan standards as well as all applicable state and federal laws and regulations. See the Clean Air Act disclosure in Appendix B and air quality sections of the DEIS in terms of compliance with the State of Oregon requirements for smoke management. Appendix B contains forest plan direction and guidance, and other policies applicable to this project.

### **Issues driving alternatives**

Public and internal scoping identified three significant planning issues that drove the development of the range of alternatives:

1. There is disagreement about the best network of roads that will allow for recreation, harvesting forest products, fire management, accessing private inholdings, administration, and other uses, while also reducing or eliminating the adverse impacts that roads may have on forest and riparian resources.
2. There is disagreement about which vegetation treatments will best restore forest structure and composition toward HRV. In particular, there is disagreement about the size and species

of trees to retain or harvest, and how to best minimize impacts from harvest and prescribed burning on forest and riparian resources.

3. There is disagreement about which types of forest management is needed, if any in Old Growth Preservation areas (Management Area 15), inventoried roadless areas, and potential wilderness areas (PWAs) to move toward HRV.

## **Other considerations**

### **Wildlife Habitat**

All action alternatives would aim to conserve or restore over the long term functional wildlife corridors for species dependent on large tree, closed canopy forest structure, within the context of the project purpose and need to move the landscape toward the range of natural variation in forested structural stages. In addition, this EIS will analyze the relative effects of the range of alternatives on wildlife habitat for management indicator species (MIS), threatened, endangered and sensitive species, and other focal species.

### **Fire and Fuels Management**

All action alternatives would aim to foster the re-introduction of planned and unplanned fire where it would be ecologically beneficial. In addition, this EIS will analyze the relative effects of the range of alternatives on fire behavior, recreation values at risk of unwanted fire, departures in forest structure and composition between current and reference conditions, wildlife habitat, threatened and endangered aquatic and terrestrial species, aquatic and riparian habitat, grassland extent, forage availability for domestic livestock, dead and down wood, snags, fuels, and wildlife habitat.

### **Economic and Social Actions**

Almost all issues and considerations have an economic facet. Analysis of the relative economic effects between alternatives will be part of this EIS, and the economic effects of the alternatives will in-turn inform the project decision. Scoping did not reveal economic conflicts or significant issues within the scope of the project purpose need.

### **Livestock Grazing**

The EIS will analyze the relative effects of the range of alternatives on forage availability and productivity, and grassland extent. Scoping did not reveal significant grazing issues within the scope of the project purpose need.

### **Watershed Management and Aquatic Habitat**

This EIS will analyze the relative effects of the range of alternatives on aquatic species (both listed and management indicator species), aquatic habitat conditions, RHCAs, and the degree of watershed restoration. As a part of alternative road networks analyzed under this EIS, the effects of aquatic organism passage restoration activities are analyzed as a common element of all alternatives.

### **Climate change adaptation**

All action alternatives include management actions that would improve the ability of national forest resources to adapt to a changing climate. The alternatives vary in the types and amount of actions. Activities for addressing climate change include the following:

- Conserving species and habitats threatened directly or indirectly by climate change, enhancing landscape connectivity, and reducing barriers to species movement to facilitate the ability of species to move across the landscape with shifts in habitat distributions
- Reducing the risk of uncharacteristically severe fires and insects and disease disturbances through forest thinning
- Reducing the risk of increased nonnative species infestations through reductions in the extent of current nonnative species and prevention of future infestations
- Reducing potential increases in stream temperatures through riparian buffers and stream restoration and maintenance of effective stream shade
- Reducing risk of water quality degradation while increasing aquatic connectivity by decreasing road density, reducing hydrological connectivity of the road system, replacing culverts, and road closure, realignment or decommissioning

### Heritage resources

All alternatives strive to meet desired conditions set forth in the WWNF plan and would comply with the National Historic Preservation Act Section 106. The goal for heritage resources is to “provide for the identification, protection, preservation, enhancement and interpretation of prehistoric and historic sites, buildings, objects, and antiquities of local, regional or National significance so as to preserve their historical, cultural, and scientific values for the benefit of the public” (4-20).

### Learning and adaptive management

Adaptive management is an interactive learning process producing improved understanding and improved management over time, with an emphasis on uncertainty about resource responses to management actions and the value of reducing that uncertainty. It is an integral part of implementation and will be addressed as part of the implementation of this project. Collaborators and the Forest Service will work together using the stated goals and objectives in this document to develop specific monitoring questions and implement monitoring strategies as part of a forthcoming implementation guide.

Franklin et al. (2013) give four key elements of monitoring:

#### **1. Acknowledge uncertainty**

Key LJCRP assumptions include:

- Silvicultural treatments will make treated stands more resilient to uncharacteristic insect, disease, and wildfire disturbances
- Understory productivity will increase in stands that are thinned and burned
- Wildlife habitat will improve as a result of silvicultural treatments and road closures
- Water quality and fish habitat will improve as a result of silvicultural treatments and road closures
- Other LJCRP project uncertainty concerning social/tribal/economic issues such as:
  - Removal of trees >21” under certain circumstances as part of a forest restoration strategy

- Restoration treatments in Management Area 15 or Inventoried Roadless Areas
- Increased forest management related jobs and economic stability within Wallowa County

## **2. Develop testable hypotheses about policy success**

### **3. Search for information to test the hypotheses**

- What data are already being collected to test hypotheses?
- What data can be easily and efficiently gathered to test multiple hypotheses?
- What data can be collected remotely?
- How can the proposed Research Natural Area within the project area be used?

### **4. Gather information to test hypotheses**

- Stands exams prior to and following treatment are conducted in areas representing various treatments, to determine diseases/extent, tree density, mortality due to planned and unplanned fire.
- Understory productivity is measured before and after treatments and noxious weed inventories are conducted
- Quality and quantity of MIS habitat in representative areas is documented before and after treatments
- Stream sedimentation and temperature monitoring by subwatershed

### **4. Develop an institutional mechanism that ensures that the hypotheses will undergo periodic, fair minded review and management policies can change as a result.**

Franklin et al (2013) note that it is often difficult for people and organizations to admit that policies, in which they are invested, have not been successful in achieving their intended goals; and that people with investments in failed policy will seek favorable assessments, rather than changing a failed policy. External review by collaborators is suggested.

- Review and revise monitoring hypotheses with collaborators
- Employ multi-party monitoring

## **Alternatives Considered in Detail**

A total of three alternatives were analyzed in detail: the No Action Alternative (Alternative 1), the Modified Proposed Action (Alternative 2), and Alternative 3. The key features of each alternative relative to the significant issues are compared in Table 11. A quantitative comparison of alternative treatments is provided in Table 13, and in the list of actions common to all alternatives, below. Maps 9-10 show vegetation treatment locations and road networks by alternative.

## **Alternative 1**

### **No Action**

Alternative 1 is the no action alternative and serves as a baseline for evaluating other alternatives during the effects analysis for proposed actions. The LJCRP would not be implemented under Alternative 1. No management actions would be taken to influence the direction or rate of change for moving existing conditions toward desired condition. Current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area. The existing land and resource conditions would be otherwise unaffected, except through natural processes. It is assumed that any previous decision not yet implemented would be implemented within the planning horizon.

## **Alternative 2 – The Modified Proposed Action**

Alternative 2 is the Proposed Action, which is described in Chapter 1. Alternative 2 is the preferred alternative.

## **Alternative 3**

Alternative 3 would be similar to Alternative 2, except there would not be commercial thinning in RHCAs, IRAs, and MA15. No trees greater than 21” would be harvested, except for safety or administrative reasons. In IRAs, there would also be no non-commercial treatments. PACFISH buffers would be followed where category 4 RHCAs are present within commercial units. Non-commercial thinning could occur in category 4 RHCAs outside old forest multi-story and old forest single story structures (OFMS and OFSS) in accordance with the Blue Mountains Project Design Criteria (PDCs). The road network aims to meet public access needs identified by Wallowa County. Relative to existing conditions, post implementation road density condition would be static for fisheries objectives and wildlife objectives. Road density objectives as stated in the 1998 Biological Opinion for the Forest Plan would be met for Snake River steelhead.

### **Forest Plan Amendments – Alternative 3**

The Forest Service proposes amending the forest plan under the 1982 planning regulations following Forest Service Handbook (FSH 1909.12 section 25) and Manual direction (FSM 1926.5) direction. The following forest plan amendments would be needed to implement Alternative 3:

1. Wildlife Standard (The Eastside Screens – Regional Forester’s Amendment # 2 for the Wallowa-Whitman Land and Resource Management Plan (forest plan)).

Alternative 3 includes about 1,201 acres of treatment designed to transform old forest multi-story conditions (which is above HRV in the project area), into old forest single story, which is below HRV (see the existing and desired conditions for vegetation, above). Alternative 3 includes 20 acres of thinning in old forest single story conditions to maintain or enhance existing conditions. This treatment would not change the overall LOS structural conditions. Therefore, this proposed treatment meets the intent of Scenario A because there will be no net loss of LOS as a result of proposed treatments. The understory thinning treatments proposed for these stands are designed to address species composition, stand density, insect susceptibility, climate change adaptation, and fire risk considerations. Specifically, they are designed to:

1. Improve tree vigor, and resistance to western pine beetle attack and future wildfire risk (see Chapter 3), thereby ensuring maintenance and persistence of the large-tree component into the future. Reestablishing a large-tree component would also increase resiliency to climate change, and the safety and effectiveness of prescribed fire applications.
2. Contribute to species composition objectives for the LJCRP. Of the 20 acres of proposed treatments in OFSS condition in Alternative 3, about 14 acres occurs in stands with a ponderosa pine (PP) cover type (PP is below HRV); the remaining 6 acres occurs in stands with a Douglas-fir (DF) cover type (DF is above HRV). The ponderosa pine treatments are designed to maintain ponderosa pine as the dominant cover type, whereas the Douglas-fir treatments are designed to convert Douglas-fir to a ponderosa pine cover type, thereby moving the landscape toward HRV.
3. Contribute to stand density objectives for the LJCRP. The entire 20 acres of proposed treatment in OFSS are designed to reduce density to low stand density. Low stand density is substantially below HRV (Table 27). In areas with wildlife habitat connectivity objectives, treatments would ensure maintenance of cover objectives. In areas with wildlife habitat connectivity objectives, treatments would ensure maintenance of cover objectives.

**Table 11. Descriptions of planning alternatives for the Lower Joseph Creek Restoration Project**

Alternative	Restoration Treatments	Management Areas	Road Network
Alt 1 (No Action)	No management actions would be taken to influence the direction or rate of change for moving existing conditions toward desired condition. Current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area.	No management actions would be taken to influence the direction or rate of change for moving existing conditions toward desired condition. Current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area.	No management actions would be taken to influence the direction or rate of change for moving existing conditions toward desired condition. Current activities such as permitted grazing, dispersed recreation use, fire protection, and scheduled road maintenance would continue within the project area.
Alt 2 (Proposed Action)	Trees greater than 21" could be harvested, within the context of restoring forest resilience, safety or administration. Treatment extent generally based on priority treatment needs to move the landscape toward HRV.	Mechanical treatments would occur in some designated old growth (MA 15), inventoried roadless areas (IRAs), potential wilderness areas (PWAs) and category 4 <sup>4</sup> riparian habitat conservation areas (RHCA) that bisect restoration treatment units not currently in old forest structure (OFSS/OFMS). No treatments in large, closed canopied forests in MA15 in moist forest. RHCA treatments based on attaining riparian management objectives. Category 4 stream	Road actions approved under existing decisions would continue to be implemented. Additional roads identified through roads analysis that could be closed or decommissioned to move wildlife habitat closer to forest plan road density standards would be treated

<sup>4</sup> Category 4 RHCA's are intermittent, non-fish bearing

Alternative	Restoration Treatments	Management Areas	Road Network
		treatments would follow upslope treatment prescriptions and have variable width (25 foot minimum) no-treatment, no equipment stream buffers. No treatments would occur in Category 1 and 2 streams, except for 58 acres of treatment specific to Swamp Creek. Small diameter thinning could occur in category 1, 2 and 4 RHCAs as per Blue Mountains Project Design Criteria <sup>5</sup> .	
Alt 3	Similar to Alternative 2, except no trees greater than 21" would be harvested, except for safety or administration.	No treatments in MA15, IRAs, and PWAs. Small diameter thinning could occur in category 1, 2 and 4 RHCAs as per Blue Mountains Project Design Criteria. No other vegetation treatments would occur in Category 1, 2 and 4 streams.	The road network meets public access needs as identified by Wallowa County.

## Activities Common to All Action Alternatives

All action alternatives would use the same suite of forest vegetation treatment types (Table 12). The design of forest vegetation management prescriptions would use the “individuals, clumps and openings” (ICO) approach (Franklin et al. 2013b) to achieve trends in forest stand-level spatial heterogeneity toward HRV.

**Table 12. Description of forest vegetation treatment types**

Treatment Types	Treatment Description
Savanna	Reestablishment of grassland/forest edges and historic grasslands that have conifer encroachment.
Single Tree Selection (STS)	ICO variable density thinning within all age classes present
Group Selection (GS)	ICO variable density thinning within all age classes present; ½ to 4 acre group selection to initiate new cohort of seral species (PP/WL).
Intermediate Treatment (IT)	ICO variable density thinning within all age classes present with emphasis on isolating mistletoe infections and creating conditions

<sup>5</sup> National Marine Fisheries Service letter of concurrence for implementation of the Blue Mountains Province Expedited Process Instrument for Programmatic Informal Consultation with Project Design Criteria on the Malheur, Wallowa-Whitman and Umatilla National Forests, and Bureau of Land Management Vale and Prineville Districts, dated November 1, 2013. NMFS No. NWR-2013-10339, Portland, OR.

Treatment Types	Treatment Description
	that reduce intensification of infection.
Stand Improvement (SI)	ICO variable density thinning within young, post disturbance stands.

The following activities and guidelines would be common to all action alternatives:

- During tree harvest, favor leaving early seral tree species
- Achieve trend in patch size distribution toward HRV
- Planned ignition priority areas are identified for the action alternatives using the same criteria, although acres of high, medium and low priority differ between the alternatives. High priority areas in both action alternatives represent the acres that are treated with either harvest or stand improvement (SI), or are in the dry upland forest potential vegetation group.
- Treat fuels associated with silvicultural treatments (activity fuels) using mastication, removal, pile and burn, cutting and scattering limbs, prescribed fire, or other means)
- Retain and protect large trees of early seral species and trees with old growth physical characteristics consistent with historical reference conditions
- Project design criteria for forest treatments in wildlife corridors in moist upland forest would retain at least 50% residual canopy closure, where available
- Project design criteria for forest treatments in wildlife corridors in dry upland forest would retain at least 40% residual canopy closure, where available
- For stands identified as moist, large tree, closed canopy, maintain an overall stand minimum canopy cover of 60%, and do not harvest any trees  $\geq 21$ " dbh
- The majority of road-related activities would make use of the existing system road network
- Appropriate actions needed to manage the transportation system would be based on a roads analysis
- Roads proposed for any type of closure will focus on improving resource and habitat conditions
- Establish two Research Natural Areas (Horse Pasture Ridge (338 acres); Haystack Rock (425 acres))
- Maintain and enhance culturally significant resources, settings, viewsheds, and sensitive plant and animal species habitat
- Provide project design criteria, standards, guidelines, and/or tactics to reduce the spread of invasive species
- Provide project design criteria, standards and/or guidelines for tree planting and conservation of advance regeneration of early seral tree species currently existing on the landscape
- Develop a monitoring strategy to support adaptive management through time
- Road maintenance and hazard tree cutting or removal
- Provide for aquatic organism passage at 6 sites in the LJCRP area

## Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of this project, duplicative of the alternatives considered in detail, or determined to be components that would cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized.

### Do not establish the RNAs

Concerns about the establishment of RNAs in the project area do not represent a significant issue. The rationales provided for amending the Forest Plan to remove these RNAs as proposed are unsupported by data, existing conditions, or science. The Forest Plan requires that these areas are managed as RNAs until establishment.

### Remove diameter/age limit for all species

Commenters during scoping expressed the need to remove diameter and age limitations from silvicultural thinning prescriptions. Due to the disruption of the disturbance regime, some climax species, such as grand fir and in some instances Douglas-fir occupy sites that would be dominated by more fire adapted species. In these instances, we also recognize the need to thin these climax species, regardless of size, in order to move the landscape towards the desired condition. However, the latest science does not support the wide-spread removal of large or old fire adapted species to hasten the transition back to a more fire adapted ecosystem.

### Consider less prescribed fire

During scoping, some commenters expressed concerns that prescribed fire could adversely impact grazing, merchantable timber and special forest products. As part of the project design features and the project's implementation plan, we will design a set of protocol that must be followed prior to, during and after implementation to coordinate with grazing permittees, so the disruption to their operations are minimal. Additionally, prescriptions and implementation timing will be designed so that impacts to forest products will be minimized or avoided all together.

### Adjust treatments in the Proposed Action for resource concerns ("Alternative 4")

An alternative was conceptualized that took the vegetation treatments from the proposed action, and the road network from Alternative 3, and adjusted vegetation and road treatments based on resource concerns. Preliminary evaluation showed that, to a large degree, the primary resource concerns were already covered under Forest Plan direction (e.g. riparian habitat conservation area management objectives, connectivity, and road density). The majority of resource concerns envisioned under this alternative are incorporated into Alternative 2 (Modified Proposed Action). Under accelerated time frames and looking to create NEPA efficiencies, choosing not to develop this alternative in detail allows for targeted comments from the public to be the key driver for development of any other alternatives within the range analyzed.

## Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be

distinguished quantitatively or qualitatively among alternatives. Relative activity levels for the Proposed Action are provided for comparative purposes only. ActionAlso see Table 64 (Chapter 3).

**Table 13. Comparison of restoration actions and effects by alternative**

<b>Criteria</b>	<b>Metric</b>	<b>Alternative 1 (No Action)</b>	<b>Proposed<sup>6</sup> Action (PA)</b>	<b>Alternative 2 (Modified PA)</b>	<b>Alternative 3</b>
Group selection	<i>Acres</i>	0	3,000	2,576	879
Intermediate treatment	<i>Acres</i>	0	400	336	189
Meadow/Savanna	<i>Acres</i>	0	800	741	285
Stand improvement	<i>Acres</i>	0	5,000	5,453	2,613
Single tree selection	<i>Acres</i>	0	13,800	12,220	8,812
Single Tree selection - old forest	<i>Acres</i>	0	2,000	793	0
Total mechanical forest treatments	<i>Acres</i>	0	25,000	22,119	12,778
High priority area for prescribed burning	<i>Acres</i>	0	<90,000	48,577	46,480
RHCA treatment	<i>Acres</i>	0	3,000	2,571	749
Cat 1 RHCA treatments	<i>Acres</i>	0	58	58	0
Cat 4 RHCA treatments	<i>Acres</i>	0	1,822	1,822	0
SI RHCA treatments	<i>Acres</i>	0	749	749	749
Forest treatments in IRAs	<i>Acres</i>	0	5,488	5,488	0
Total open USFS roads	<i>Miles</i>	219	219	198	221
Aquatic organism passage improvements	<i># culverts</i>	0	6	6	6
Road construction	<i>Miles</i>	0	1.5	0	0
Road reconstruction	<i>Miles</i>	0	24	82.6	82.6
Temporary road construction	<i>Miles</i>	0	26	12.6	12.6
Roads in RHCAs - Lower Joseph	<i>Miles</i>	17.3	N/A	15.7	16
Roads in RHCAs - Upper Joseph	<i>Miles</i>	38.2	N/A	38	38
Total stream crossings Lower Joseph Creek	<i>Miles</i>	205	N/A	187	189
Total stream crossings Upper Joseph Creek	<i>Miles</i>	280	N/A	277	277
Total road density Lower Joseph	<i>Miles/Sq Mile</i>	1.30	N/A	1.10	1.20
Total road density Upper Joseph	<i>Miles/Sq Mile</i>	1.10	N/A	1.10	1.50
Open road density <sup>7</sup> – Broady Creek (MA1)	<i>Miles/Sq Mile</i>	1.6	N/A	1.6	2.7
Open road density – Cougar Creek (MA1)	<i>Miles/Sq Mile</i>	3.7	N/A	3.2	3.5

<sup>6</sup> The proposed action published in the federal register and used in scoping is provided here for comparison to the modified proposed action, which was analyzed in detail in this DEIS.

<sup>7</sup> The six subwatersheds not listed here do not substantially differ in open road density (MA1).

Criteria	Metric	Alternative 1 (No Action)	Proposed <sup>6</sup> Action (PA)	Alternative 2 (Modified PA)	Alternative 3
Open road density – Lower Swamp Creek (MA1)	<i>Miles/Sq Mile</i>	2.7	N/A	2.7	3.0
Seasonal open road density – Sumac Creek	<i>Miles/Sq Mile</i>	1.4	N/A	0.9	1.1
Restoration jobs	<i>#</i>	0	N/A	55	34
Commercial thinning in wildlife connectivity corridors	<i>% of corridors thinned</i>	0	N/A	34	17
Timber volume removed	<i>million cubic feet</i>	0	N/A	10.4	6.6
Movement toward need to reduce stand densities	<i>Departure from HRV</i>	Remains outside HRV	N/A	Moves toward HRV more than alt 3	Moves toward HRV less than 2
Movement toward need to increase early seral species	<i>Departure from HRV</i>	Remains outside HRV	N/A	Early seral tree species move toward HRV more than alt 3	Early seral tree species move toward HRV, but less than alt 2
Movement toward need to increase large tree characteristics	<i>Departure from HRV</i>	Remains outside HRV	N/A	Large tree abundance greater than alts 1 and 3	Large tree abundance greater than alts 1 and less than 2
Movement toward need to reduce uncharacteristic fire	<i>Departure from HRV</i>	Remains outside HRV	N/A	High severity fire closer to HRV	High severity fire closer to HRV, but more area burns than alt2



## Chapter 3. Affected Environment and Environmental Consequences

### Introduction

#### Affected Environment

The LJCRP lies on the eastern side of the Blue Mountains ecoregion, which extends from the Redmond area of Central Oregon, to Hells Canyon on the Snake River. The Blue Mountains are lower and more open than the neighboring Cascades and Northern Rocky Mountains.

The most distinctive characteristics of the LJCRP area include:

- Joseph Creek, which is the primary drainage for the analysis area and is fed by several other minor tributaries before terminating in the Grande Ronde River, less than five miles before it meets the Snake River. Joseph Creek is a designated stronghold<sup>8</sup> by the Nez Perce tribe for Snake River steelhead (Nez Perce Tribe 2013).
- Vegetation mosaics of dry and moist forest, ponderosa pine savanna, and grassland. Vegetation displays moderate departure from natural ranges of variation in structure and composition.
- Canyons with high runoff potential, capped by more stable and highly productive incised plateaus with higher water infiltration, and lower runoff potential.
- Rich mollisol soils, a temperate climate, and historically frequent low severity fire regimes, which in the absence of fire suppression, naturally favor largely open, fire-adapted forests and grasslands.
- One fish species listed as threatened under the Endangered Species Act (ESA).
- One aquatic and five plant species listed as sensitive on the USFS Regional Forester's sensitive species list.
- Populations of big game, such as Rocky Mountain elk, and habitat for other wildlife species of interest such as pileated woodpecker, American marten, northern goshawk, and white-headed woodpecker.
- Invasive plants, including state listed noxious weeds such as, diffuse knapweed (*Centaurea diffusa*) and yellow starthistle (*Centaurea solstitialis*), as well as invasive annual grasses such as ventenata and cheatgrass.
- Approximately 42 miles of designated Forest Service trails, and 406 miles of NFS roads.
- Eighteen domestic grazing allotments and sources of wood fiber for the forest products industry.
- Remoteness from human population centers, and relatively low visitation. Aside from use by domestic grazing permittees, human use occurs mainly during the hunting season and consists primarily of horseback riding, hiking, firewood cutting, and motorized vehicle use.

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<sup>8</sup> Designated strongholds represent areas with historic high production, focal areas for recent tribal harvest, and are viewed as essential for long term population persistence.

## The physical environment

### Climate

The LJCRP experiences annual precipitation totals generally below 20 inches per year. Highest normal precipitation totals tend to be in winter and late spring. Monthly precipitation distribution is relatively uniform throughout the year. Drought is a common occurrence, and conditions are generally moisture-limited for tree growth. Annual temperature variations tend to be relatively large. Mean maximum temperatures are mostly in the 80's (°F) in summer months and in the 30's in winter. The dry, clear summer days are usually followed by cool nights; nighttime lows generally average in the 40's (National Oceanic and Atmospheric Administration 2014).

Climate across the project area and the greater Blue Mountains is changing, and these changes will influence local ecosystems and their role in human communities. Average annual temperatures in the Pacific Northwest have risen by 1.5 °F since 1900. Since 1950, temperatures have risen at twice the rate of increase that occurred before 1950 (Mote 2003a). Temperatures are expected to increase by 0.2 to 1 °F per decade throughout the 21st century.

Based on average data for Blue Mountains (Oregon climate zone 8), average precipitation is lower since 1970 for every month except April, July, and August. Cool season (October through March) precipitation is lower by 14 percent; warm season precipitation (April through September) is lower by 2 percent; July and August precipitation is higher by 27 percent.

Decline in April 1 snowpack - all but 2 of 34 measuring stations have recorded declines in April 1 snowpack since 1970, with an average decline of 24 percent and a range of 5 to minus-73 percent (Gecy 2010). Snowpack declines are expected to continue across the Blue Mountains as temperatures throughout the region increase. Continued warming is expected to result in more winter precipitation falling as rain rather than snow and less winter snow accumulation.

The projected increase in air temperatures and the resulting effect on snow pack and timing and magnitude of rainfall is predicted to have considerable impact on natural resources and their management in the region and in the Blue Mountains. Changing climates in the next several decades may further complicate fire management by increasing temperatures, fire season length, and size of annual burned area (McKenzie et al. 2004, Westerling et al. 2006, Cansler and McKenzie 2014). Projected increases in temperature will likely result in an extended fire season and late season drought. Fires will likely occur earlier and later than current and reference fire regime conditions. The total area burned will also likely increase regionally including in the Blue Mountains and the Lower Joseph Project area. Fire size, duration and severity could increase and result in uncharacteristic changes in distribution and amount of dominant cover type.

The current trends in climate change will lead to prolonging the late season drought leading to increased occurrence of fire potential coupled with fire suppression policies could lead to larger more severe and uncharacteristic fires particularly most obvious in the moisture limited and dryer moist upland forest plant associations. Recent drought susceptibility modeling has developed maps highlighting the most at risk areas of drought that can help identify increased risk for disrupted disturbance processes with increased severity. Drought, along with other biophysical factors, also influences susceptibility and vulnerability to insect and disease disturbances (Hessburg et al. 1999, Lehmkuhl et al. 1994, Schmitt and Powell 2005).

Increasing air temperatures, decline in snowpack and changes in the magnitude and timing of rainfall are expected to reduce summer streamflow, increase cool season streamflow, and increase stream temperatures at least during the next century throughout the Pacific Northwest. These changes in streamflow and temperature have the potential to directly impact aquatic habitat and organisms. Climate change may affect water storage and seasonal water availability in climate change scenarios that reflect a warming climate (Mantua 2010). Snow pack will decrease in these scenarios, thus reducing the intensity of peak flows. The Droughty Soils Index analysis, conducted by Oregon State University (2014), predicts the susceptibility of soils within the LJCRP analysis area (Map 11). Their results indicate that soils within the proposed treatment area are particularly susceptible to a warming climate. Moving the landscape to a more resilient species composition and structure, described in the Desired Conditions, would help respond to predicted climate change scenarios. Moving the vegetation towards the historic range of variation and creating a more fire resilient landscape will mitigate some of the effects of a seasonal reduction in water storage.

Surface erosion and subsequent sedimentation would have the potential to increase as a result of larger more intense disturbances (Nearing 2004).

Ecosystems are affected not only by climate change but also through carbon sequestration (e.g., plant growth) and greenhouse gas emissions (e.g., fire, organic matter decomposition, and soil respiration). Ecosystem functions also directly influence the global carbon cycle.

Forest management can offset greenhouse gas emissions by increasing capacity for carbon uptake and storage in biomass, wood products, and soils. Forests of the Blue Mountains currently store substantial carbon stocks. Forest management activities and disturbances, such as wildland fire, can either increase or reduce carbon stocks over time, depending on their type, frequency, and severity. In general, current Forest Service management activities are unlikely to affect carbon stocks substantially in the Blue Mountains.

Carbon is also stored in wood products that are harvested from Oregon's forests, but wood products are unlikely to provide for substantial increases in stored carbon under current manufacturing, use, and disposal practices. Management activities carried out in response to climate change, such as thinning of forests to reduce risk of stand replacing wildland fire or insects disturbances, or to reduce moisture stress on the remaining trees, may reduce carbon stocks in the short term, but can have long-term benefits for carbon sequestration (Zhang et al. 2010).

## Geomorphology and Soils

The LJCRP is within the Blue Mountains physiographic province and is contained within the Lower Grande Ronde river subbasin (Map 3). The LJCRP is characterized by plateaus and canyons, founded by Columbia River Basalts and capped with a mosaic of volcanic ash and loess deposits (Bennett and Noller, Draft). Steep washboard canyons in the lower elevations feed into Joseph Creek and are less stable than the plateaus and have a high runoff potential. These canyons are capped by stable and highly productive incised plateaus in the east and angulate plateaus in the southernmost extent (Map 12). These plateaus have much higher water infiltration, lower runoff potential, and contribute much less sediment to the hydrologic system. If defined channels are present, they are typically first order (small tributaries with intermittent flow) and field observations indicate that they are more likely to support upland vegetation.

Soils within the LJCRP analysis area are dominated by mollisols (Map 13). These soils have organic rich surface layers associated with ponderosa pine and are indicators that widely spaced forest vegetation with significant grass and forb understory occupy, or once occupied these areas. Frequent fire was an important mechanism in the development of these organic rich soils which dually maintained an open understory (Abella et al. 2013). Due to the forage production potential and shallow slope gradients on plateaus, mollic intergrades also provide high quality range and wildlife habitat. Andisols make up the balance of the soils in the analysis area. These soils are formed in volcanic ash, are young and generally have a much higher water holding capacity which makes them some of the most productive soils to support forested vegetation in the Pacific Northwest. Loess derived from the Palouse, Mazama and Glacier Peak ash deposits supplement the soil complexes in the project area (Johnson 1987) (Table 14).

**Table 14. Generalized vegetation by soil type for the LJCRP**

<b>Residual Soils</b>	<b>Ash/Andisols</b>	<b>Loess/Mollic intergrades</b>
bluebunch wheatgrass	grand fir	Idaho fescue
xeric shrublands	subalpine fir	Douglas-fir
lithosols		ponderosa pine
ponderosa pine		

Soil productivity is closely related to ash and loess content of soils. Ash soils have high water holding capacity, high infiltration rates, low compactability, high detachability, and a concentration of nutrients in the upper surface layers. Loess soils hold a large amount of nutrients (high in base saturation) and are high in nutrient reserve. Productivity of plant associations found on loess soils such as Idaho fescue-prairie junegrass associations have nearly three times the dry weight biomass of plant associations such as bluebunch wheatgrass-sandbergs bluegrass which grow on residual soils (Johnson 1987).

Soil water holding capacity has historically been extremely important in the Wallowa-Snake province, where summer precipitation is typically very low. Rock fragment content, depth of surface soil material, rooting depth, and presence of clay all influence soil water holding capacity and in turn contribute to vegetation composition (Johnson and Simon 1987).

Approximately, 70% of the soils on NFS lands within the analysis area have an ash component which indicates higher productivity but suggests that many of the soils will be susceptible to compaction. Soil compaction or an increase in soil bulk density, can alter the hydrologic function of a site and have negative impacts on productivity. It decreases a soil's infiltration rate which leads to increased overland flow, increased surface erosion, and, potentially, increased sediment delivered to creeks. Dry meadows and scablands occur on plateau tops and ridges and are scattered throughout the project area but are not usually included in harvest units. Dry meadows and scablands are defined as having shallow, rocky soils with drought tolerant plants (Johnson 1987). These soils have more rock and clay than soils influenced by loess or volcanic ash. When located on concave surfaces, these soils are often saturated until mid to late July. Disturbance tends to disrupt the biological soil crust (BSC) resulting in exposed bare ground, loosened surface rock, and a decline in principle grass species. Loss of BSC can take years (decades) to re-establish. When you lose BSC, increases in non-native annual grasses and other invasive non-native plant species can happen more easily.

The soils and geology in the subject analysis area are not prone to frequent mass movement, though if there is a big enough rainfall event, debris flows may occur. A review of the Statewide Landslide Information Database from the Oregon Department of Geology and Minerals Industries indicate no record of historic landslides within the analysis area (Industries 2014).

Detrimental Soil Conditions (DSC) directly impact soil productivity by displacement, compaction, loss of organic matter, rutting, erosion and loss of porosity. Land management activities, such as road construction and heavy equipment operation have the greatest potential to create detrimental soil conditions. Land managers can reasonably predict that helicopter and skyline harvest activities will not degrade soil conditions below acceptable tolerances (Reeves et al. 2011). Therefore, temporary roads and ground based harvest activities will be the focus and measure of detrimental soil conditions.

A review of historic harvest activities in units proposed for management in the LJCRP area indicate 20,000 acres of previous ground based harvest. Detailed investigations of similar units in the area (Puderbaugh and Kahler Environmental Assessments) indicate pre-treatment DSCs ranging up to 20% with a median distribution of approximately 8%. An evaluation of aerial photography and field conditions for the LJCRP area indicate similar conditions. Mitigation measures are incorporated into project design to manage DSCs within the allowable WWNF plan tolerances of 20%. This may include remediation of DSCs created as a result of proposed activities and remediation of affects from previous management activities, inside and outside planned activity units. Conditions existing outside of planned activity units that should be remediated through subsoiling and revegetation include legacy travel routes, user created routes, legacy skid trails and landing sites.

## Minerals

The goals of minerals management include providing for exploration, development, and production of a variety of minerals on the Forest in coordination with other resource objectives, environmental considerations and mining laws. These goals aim to encourage and assist, whenever possible, the continuation of regional geologic mapping and mineral resource studies on the forest in cooperation with other natural resource agencies.

There are no approved Plans of Operations for mineral resources on NFS lands within the LJCRP analysis area at the time of writing. The Hells Canyon National Recreation Area (HCNRA) Act of 1975 included the withdrawal of all future mineral development within the HCNRA. The proposed activities across all alternatives will not conflict with the General Mining Law of 1872, as amended; the Federal Land Policy and Management Act of 1976, as amended and the Surface Resources Act of 1955. The proposed activities across all alternatives are also consistent with the Goals and Standard and Guidelines defined in the WWNF Plan (USDA Forest Plan, 1990) and outlined in Appendix B.

## Water, watersheds and riparian habitat conservation areas

The LJCRP area is located within the Upper Joseph Creek (HUC 170601060203) and Lower Joseph Creek (HUC 170601060204) watersheds of the Grande Ronde River Basin (Map 3). The specific subwatersheds in the project area are listed in Table 15.

**Table 15. Watersheds and subwatersheds of the Lower Joseph Creek Restoration project.**

<b>Watershed Name/Number</b>	<b>Subwatershed Name/Number</b>	<b>SWS Acres (Total)</b>	<b>Project Area Acres w/in SWS</b>	<b>Project Area FS Acres w/in SWS</b>	<b>Other SWS Acres (Private, State &amp; BLM)</b>
Lower Joseph Creek 1706010606	Horse Creek/ 170601060605	12,341	12,337	5,770	Private 6,286 Vale BLM 275 Washington 6
Lower Joseph Creek 1706010606	JosephCr.- Rush Creek/ 170601060602	20,484	2,0482	5,6700	Oregon 639 Private 12,800 Vale BLM 1,373
Lower Joseph Creek 1706010606	Lower Cottonwood Creek/170601060606	14,991	1,4992	6,709	Private 7,318 Vale BLM 709 Washington 256
Lower Joseph Creek 1706010606	Upper Cottonwood Creek/170601060603	13,509	13,508	12,248	Private 1,259 Vale BLM 0.18
Lower Joseph Creek 1706010606	Broady Creek/170601060604	13,561	13,559	1,0268	Private 2,847 Vale BLM 444
Upper Joseph Creek 1706010605	Davis Creek./170601060506	10,759	10,621	7,950	Private 2,671
Upper Joseph Creek 1706010605	Elk Creek./170601060502	16,814	46	31	Private 15
Upper Joseph Creek 1706010605	Joseph Creek Cougar Creek/170601060508	13,431	13,429	12,80	Private 450
Upper Joseph Creek 1706010605	Joseph Cr-Sumac Creek/170601060504	11,115	11,085	9,594	Private 1,491
Upper Joseph Creek 1706010605	Lower Swamp Creek/170601060507	21,914	21,824	14,877	Oregon 1 Private 6,945

The relevant inclusive beneficial uses of the Lower Grande Ronde Subbasin and its tributaries as determined by the Oregon Department of Environmental Quality (2010) are:

- Public Domestic Water Supply
- Private Domestic Water Supply
- Industrial Water Supply
- Irrigation
- Livestock Watering
- Fish and Aquatic Life
- Wildlife and Hunting

- Fishing
- Boating
- Water Contact
- Recreation
- Aesthetic Quality
- Hydro Power

The Clean Water Act (1972) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under section 303(d) of the Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters. These are waters that are too polluted or otherwise degraded to meet the water quality standards set by states, territories, or authorized tribes. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop total maximum daily loads (TMDLs) for these waters. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards.

A suite of TMDLs were approved by the Department of Environmental Quality for the Lower Grande Ronde Subbasin in September of 2010. However, not all pollutants were adequately addressed in these plans and thus remain on the list of impaired waters. Regardless of whether an impaired waterbody has an approved TMDL established (303(d); Category 4) or one is still needed (303(d); Category 5), the waterbody is still classified as water quality limited (303 (d) listed) for not meeting applicable state water quality standards (Map 6).

The following table details relevant water quality limited (303 (d) listed) stream reaches that may be affected by the LJCRP (Table 16). The desired conditions for streams within the planning area are to ensure their compliance with all applicable Water Quality Management Plans and maintain water quality for all beneficial uses.

**Table 16. Water quality limited waters associated with the Lower Joseph Creek Restoration Project analysis area.**

Waterbody	Pollutant	Season	Beneficial Uses Affect by Pollutant	Status (2010)
Davis Creek Mile 0-10.7	Flow Modification	Undefined	Resident fish and aquatic life. Salmonid fish rearing Salmonid fish spawning	Water quality limited not needing a TMDL
Swamp Creek Mile 0-26.6	Flow Modification	Undefined	Resident fish and aquatic life. Salmonid fish rearing Salmonid fish spawning	Water quality limited not needing a TMDL
Joseph Creek Mile 8.1-48.2	Flow Modification	Undefined	Resident fish and aquatic life. Salmonid fish rearing Salmonid fish spawning	Water quality limited not needing a TMDL
Joseph Creek Mile 8.1-48.2	Habitat Modification	Year- round	Salmon and trout rearing and migration: 18.0 degrees Celsius 7-day-average maximum	Category 4a: (delisted) TMDL approved - 2010.

Streams in the LJCRP area are classified by their fish bearing characteristics, their water carrying duration (perennial or non-perennial), and the nature of the stream, pond or wetland, and whether there are landslide prone areas. This classification is further bounded by the riparian area zone of influence on

those stream classifications known as Riparian Habitat Conservation Areas (RHCAs) (USDA Forest Service and USDI Bureau of Land Management 1995). RHCA widths and management area descriptions, which are used to assess the effects of actions on the buffered RHCAs, are displayed in Table 17. RHCA boundaries are estimated in GIS for planning and analysis purposes. Tables 18-19 summarize RHCA acres by subwatershed for each category stream for the Upper and Lower Joseph Creek watersheds, respectively.

**Table 17. RHCA widths and management area descriptions for the Lower Joseph Creek Project Area.**

RHCA Category	Stream / Feature Type	Description
1	Fish Bearing Streams	Distance equal to 2 site potential trees or 300 feet slope distance from the edge of the active channel, whichever is greatest
2	Perennial Nonfish Bearing Streams	Distance equal to 1 site potential trees or 150 feet slope distance from the edge of the active channel, whichever is greatest
3	Ponds, Wetlands (≥1 acre in size)	Distance equal to 1 site potential trees or 150 feet slope distance from the edge of the active channel, whichever is greatest
4	Intermittent Nonfish Bearing Streams, Wetlands (<1 acre in size)	Distance equal to 1 site potential trees or 100 feet slope distance from the edge of the active channel, whichever is greatest
4	Landslides and Landslide-prone Areas	Distance equal to 1 site potential trees or 100 feet slope distance from the edge of the landslide or landslide-prone areas, whichever is greatest

**Table 18. RHCA Acres by subwatershed for each Category Stream in the LJCRP Area for Upper Joseph Creek Watershed**

Subwatershed Name	Category 1 RHCAs (acres)		Category 2 RHCAs (acres)		Category 4 RHCAs (acres)	
	Total	FS	Total	FS	Total	FS
Broady Creek	875	587	143	143	1,407	1,085
Horse Creek	713	411	132	47	2,356	1,115
Rush Creek	1,174	108	464	215	2,178	552
Lower Cottonwood Creek	867	169	224	173	1,583	816
Upper Cottonwood Creek	806	716	130	130	2,179	1,996
Peavine Creek	997	643	166	166	1,698	1,276
<b>Total:</b>	<b>5,432</b>	<b>2,634</b>	<b>1,259</b>	<b>874</b>	<b>11,401</b>	<b>6,840</b>

**Table 19. RHCA Acres by subwatershed for each Category Stream in the LJCRP Area for Lower Joseph Creek Watershed**

Subwatershed Name	Category 1 RHCAs (acres)	Category 1 RHCAs (acres)	Category 2 RHCAs (acres)	Category 2 RHCAs (acres)	Category 4 RHCAs (acres)	Category 4 RHCAs (acres)
	Total	FS	Total	FS	Total	FS
Cougar Creek	869	713	155	155	1,596	1,578

Subwatershed Name	Category I RHCAs (acres)	Category I RHCAs (acres)	Category 2 RHCAs (acres)	Category 2 RHCAs (acres)	Category 4 RHCAs (acres)	Category 4 RHCAs (acres)
Sumac Creek	826	293	152	134	1,032	945
Lower Swamp Creek	1,550	1,144	137	113	2,667	1,822
Davis Creek	883	715	0	0	1205	907
<b>Total:</b>	<b>4128</b>	<b>2865</b>	<b>444</b>	<b>402</b>	<b>6500</b>	<b>5252</b>

Table 20 shows the results of aquatic habitat surveys for those streams that have had habitat surveys completed within the project area. Aquatic habitat surveys are conducted on fish bearing streams only. Habitat survey results show the context of RMOs for fish bearing streams. Treatments of Category 4 RHCAs are related to the downstream RMOs (see Table 8, Chapter 1). This information was obtained from the Region 6 stream survey database and surveys are on file at the WWNF.

**Table 20. Results of aquatic habitat surveys for streams within the Lower Joseph project area.**

Stream/Year Surveyed	Survey Length (miles)	Pools (#/mile)	%Fine Sediment (<64mm)	Stable Banks (%)	Width/ Depth Ratio	Large Woody Debris (LWD) (pcs/mi)
Swamp Creek(2004)	15.44	8	79.5	78	22.1	6
Davis Creek (1995)	6.92	26	ND	95	9.9	67
Elk Creek (1990)	9.08	15	ND	ND	17.5	25
Little Elk Creek (1990)	2.07	11	ND	ND	8.2	29
Joseph Creek(2005)	5.8	3	80	ND	16.8	<1
Broady Creek (1992)	6.55	23	ND	ND	15.7	101
EF Broady Creek(1997)	3.14	34	53.7	99	6.6	113
Cottonwood Creek (1994)	7.15	29	ND	95	16.3	76
Cougar Creek (2005)	2.86	55	80	95	19.6	2
Peavine Creek (1998)	1.74	24.7	68.8	ND	10.9	7

ND=No Data

The two stream flow parameters of concern are low flows affecting aquatic habitat and effects of increased peak flows on stream channel stability. These parameters are currently not affected by management activity. Peak flow is primarily affected by an increase in the road network. The roads in LJCRP area have been in place for many decades and streams have adjusted to whatever affect they may have had (also see Climate Change section, above). Many of the streams in the analysis area flow intermittently, and it is likely more streams or more lengths of stream may exhibit that trait as climate change continues. Current impacts to water resources include flow modification (three water quality-limited streams), an elevated total road density on NFS lands in four subwatersheds, and degraded streambanks from grazing.

### Riparian management objectives

Table 10 (Chapter 1) summarizes riparian management objectives for the LJCRP. Landscape-scale interim RMOs describing good habitat for anadromous fish at the watershed scale were developed using stream inventory data for pool frequency, large woody debris, bank stability, and width to depth ratio. The existing condition for those RMOs is found in Table 20. State water quality standards were used to define favorable water temperatures. These RMOs are stream centric and do not reflect vegetation RMOs within the RHCAs.

There are 11 fish bearing (PACFISH Category 1) streams in the analysis area. Ten of the 11 fish-bearing streams have had stream surveys completed. Sumac Creek has not had a stream survey completed, and stream survey information is dated (over 10 years old) for some of the streams. However, recent field examination of some of the streams show that no significant measureable changes have taken place in the LJCRP watersheds that would lead to a change in geomorphic parameters. Fish habitat in the project area generally does not meet RMOs for pool habitat and width-to-depth ratio (Table 20) and is considered to be Not Properly Functioning.

For the LJCRP, the two RMOs that may be affected by the implementation of any action alternative will be stream temperature and fine sediment. These two RMOs may be affected from forest and fuel treatments primarily in the Category 4 Riparian Habitat Conservation Areas (RHCAs). The potential effect to RMOs will be conveyed downstream to the fish bearing streams where RMOs have been developed and should be applied. The temperature RMO is considered to be Functioning at Risk and the sediment RMO is considered to be Not Properly Functioning.

Fine sediment will be stored in Category 4 streams behind large wood debris that will be delivered from the RHCA. This fine sediment will then be routed downstream, metered out over time, to downstream fish bearing stream where the fine sediment RMOs are assessed.

The stream temperature RMO will not be affected by any action alternative that treats Category 4 RHCAs. Since the Category 4 stream is intermittent and not flowing during the time frame where the max 7-day average is measured the actions will not affect the stream temperature RMO. The remaining RMOs will not be affected by any of the action alternatives due to the implementation of Project Design Criteria (PDC)(see Appendix J). The PDCs will serve to maintain and not retard attainment of RMOs.

Four streams surveyed in the project area were below the RMO for pools/mile at the time of the survey.

The Forest Plan water temperature standards are to meet state water quality standards and prevent measurable increases in water temperature (1990 Forest Plan, 1995 PACFISH Amendment), and maintain maximum water temperatures below 64°F within migration and rearing habitat and below 60°F within spawning habitats (USDA Forest Service and USDI Bureau of Land Management 1995). See Appendix B for more information on applicable forest plan direction for watersheds. The Oregon Department of Environmental Quality (ODEQ) state water quality standard is based on the maximum 7-day running average. Temperature standards were developed based on temperature requirements of salmonids during different seasons and life stages. There is one standard applicable to streams within the Lower Joseph project area. The temperature standard for these water bodies is 64.4°F for salmon and trout spawning and rearing. Temperature standards for streams in the Lower Joseph project area are shown in Table 21.

**Table 21. ODEQ temperature standards for streams within the Lower Joseph project area.**

<b>Subwatershed</b>	<b>Fishbearing Streams in Project Area of Subwatershed</b>	<b>Temperature Standard Water Bodies Must Not Be Warmer Than: (Maximum Weekly Average Temperature)</b>
Davis Creek./ 170601060506	Davis Creek	64.4°F- for salmon and trout rearing and migration
Broady Creek/170601060604	Broady Creek	64.4°F- for salmon and trout rearing and migration
Joseph Cr – Cougar Creek/ 170601060508	Cougar Creek	64.4°F- for salmon and trout rearing and migration

Water temperature influences the metabolism, behavior, and health of fish and other aquatic organisms. Fish can survive at temperatures near extremes of suitable temperature ranges. However, growth is reduced at low temperatures because all metabolic processes are slowed. At the opposite extreme, growth is reduced at high temperatures because most or all energy from food must be used for maintenance needs. Fish are also more susceptible to diseases near the extremes of their suitable temperature ranges. In general, redband trout and steelhead will occupy waterbodies with water temperatures from 55 to 64°F. Upper lethal temperature for steelhead is about 75°F.

Limited water temperature monitoring has occurred in the analysis area (Table 22). The 7-day average temperature in Upper Davis and Lower Davis Creek remained below the 18° C/64.4° F standard for the period of record. The two sites on upper Swamp Creek remain at or slightly elevated above the standard and the site at lower Swamp Creek is consistently elevated above the standard for the period of record. Joseph Creek has record elevated temperatures of at least 15 degrees above the standard. Cougar and Broady Creek are consistently below the standard.

**Table 22. Results of stream temperature monitoring within the Lower Joseph project area.**

Location	Maximum Weekly Average Temperature (F°)								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Upper Davis Creek							63.9	63.3	
Lower Davis Creek							59.7	57.6	68.5
Swamp Creek @ FS Bndry		64.2	66.0	65.8	63.3				66.6
Swamp Creek @ Bennett Pasture	67.8	67.8		68.5	65.3				
Swamp Creek @Ford (WG5)	73.9	73.2	77.2	74.7	70.9	72.9		70.9	
Joseph Creek						81.0		79.0	82.2
Cougar Creek						62.1	61.9		
Broady Creek below WF								58.6	59.5
Elk Creek @ Bridge (below Gould Gulch)	66.6	63.9	66.7	66.0	63.3	65.1	64.8	64.2	66.9

Four of the 10 streams with fish habitat surveys have high percentages of streambank stability ranging from 95% to 99% stable streambanks (Table 20). One stream, Swamp Creek, was below the RMO for streambank stability. No streambank stability data is available for five of the streams surveyed.

Three of the 10 streams surveyed meet the PACFISH width to depth ratio of <10. The width to depth ratios for the remaining seven streams surveyed within the project area exceeded the PACFISH width to depth ratio of <10. However, the width to depth ratios for these eight streams are within the expected range of Rosgen stream types (Rosgen, 1996). All streams are classified as Rosgen B type channels with the exception of Swamp Creek and Davis Creek which are classified as Rosgen C type channels.

Seven of the 10 streams surveyed within the project area exceeded the standard of > 20 pieces of large wood per mile. Three streams had less than 20 pieces of large wood per mile.

### Sediment delivery to streams

Composition of the stream substrate is an important feature of aquatic habitat. Cobble and gravel substrates provide habitat for a diverse assemblage of benthic macroinvertebrates as well as eggs and

early life stages of numerous fish species. Macroinvertebrates represent a substantial portion of the diet available to various fish species, particularly stream dwelling salmonids.

Fine sediment in streams is a normal component of salmonid habitat; however, major disruptions of aquatic ecosystems occur when sediment levels substantially exceed natural levels. Filling of interstitial spaces (i.e. the gaps between rocks on the stream bottom) with fine sediment (particles < 2 mm in size) eliminates habitat for many macroinvertebrates. Fish eggs and early life stages can also be buried and smothered when interstitial spaces are embedded with fine sediment. Studies have shown that an increase in 1-3mm size sand from 20% to 30% can decrease emergent survival of salmonid species from 65% down to 40% (Phillips et al. 1975). Fine sediments are known to impact fry emergence and survival, and fine sediment (<6.5mm in size) levels above 40% can effectively eliminate salmonid populations and many macroinvertebrate species (Everest and Harr 2008). Winter habitat for juvenile salmonids is also lost as interstitial spaces in cobble-sized and larger streambed material are embedded with fine sediment.

Increases in fine sediment can occur from increased transport of fine sediment from upland areas and from destabilized stream banks. Increases can result from both episodic sources such as wildfires or from chronic sources such as native surface roads. Episodic sources normally result in short-term increases that return to pre-disturbance levels through natural recovery processes. Chronic sources can result in long-term changes of stream channels and aquatic habitat.

The forest plan (1990) standard and guideline for fine sediment is “Where natural stream characteristics permit...limiting fine inorganic sediment covering stream substrate to 15 percent...” (Wildlife S&G 1). Fine inorganic sediment is defined as sand and silty material less than 3.3 mm in size. The PACFISH amendment (1995) did not include an RMO for fine sediment. The Forest Plan standard was modified in 1995 and subsequently in 1998 as part of the Endangered Species Act (ESA) consultations on the Forest Plan to <20% fine sediment (particles <6.4mm in size) in spawning areas or < 30% embeddedness (Service 1995, National Marine Fisheries Service 1998).

Fine sediment levels currently exceed the 20% threshold established under ESA consultation for the Forest Plan (NMFS 1995, 1998) in Swamp, Joseph, E.F. Broady, Cougar and Peavine creeks (Table 19). There is no data for Davis, Elk, Little Elk, Broady, and Cottonwood creeks.

Roads provide a substantial source of sediment and a mechanism for delivering sediment to the stream systems. The Biological Opinion (NOAA 1998) for Snake River Steelhead on the Wallowa-Whitman National Forest plan describes a Term and Condition to achieve a 2.0 miles per square mile of total road density (open and closed) within a 5th field HUC. In addition to total road density two additional indicators of sediment delivery will be assessed; total number of stream crossings and total miles of road within RHCAs. These two have been used to assess the potential impacts on streams from the transportation system.

The existing condition of the transportation system is displayed in Tables 23 and 24. The existing condition transportation layer is based on USFS data, as amended by Wallowa County in 2010 (Wallowa County 2014), and by field review in 2014.

**Table 23. Total existing lengths (miles) and densities (miles/square mile) of roads in the watersheds affected by the Lower Joseph Creek project area.**

Watershed Name	Drainage Area (mi <sup>2</sup> )	Total FS Open Roads (mi)	Total FS Closed Road (mi)	FS Open and Closed Road Density (mi/mi <sup>2</sup> )	Total Number of Stream Crossings	Miles of Road in RHCAs
Upper Joseph Creek	170.07	128.2	59.0	1.10	482	38.21
Lower Joseph Creek	163.64	107.7	111.5	1.30	462	17.26

**Table 24. Total existing lengths (miles) and densities (miles/square mile) of roads in the subwatersheds affected by the Lower Joseph project area.**

Subwatershed Name	Drainage Area (mi <sup>2</sup> )	Total FS Open Roads (mi)	Total FS Closed Road (mi)	FS Open and Closed Road Density (mi/mi <sup>2</sup> )	Total Number of Stream Crossings	FS Roads in RHCAs (mi)
Broady Creek	21.19	33.54	12.26	2.2	75	8.48
Horse Creek	19.28	15.64	9.76	1.3	81	4.33
Rush Creek	32.01	17.43	24.87	1.3	9	1.47
Lower Cottonwood Creek	23.42	5.71	10.4	0.7	3	0.23
Upper Cottonwood Creek	21.11	14.42	12.6	1.3	29	2.03
Cougar Creek	20.99	31.19	23.11	2.6	62	7.61
Sumac Creek	17.37	36.87	18.93	3.2	96	14.86
Lower Swamp Creek	34.24	33.42	26.88	1.8	78	9.52
Davis Creek	16.81	26.69	22.11	2.9	44	6.23
Peavine Creek	23.01	20.93	9.77	1.3	9	0.73

There are approximately 112.92 miles of open and closed roads within RHCAs and 485 stream crossings in the LJCRP area. Subwatersheds that have elevated road densities are Broady Creek, Cougar Creek, Davis Creek and Sumac Creek. Sumac Creek also has an elevated number of stream crossings and miles of road in RHCAs based on drainage area and relative to other subwatersheds.

There are six culverts within the project area that are partial or complete barriers to the upstream migration of fish, creating an issue of habitat connectivity. The culverts are located on Broady Creek and tributaries (four culverts), Davis Creek, and Sumac Creek (Table 25). None of the six culverts identified are complete barriers. Some level of passage is evidenced by the presence of spawning and juvenile salmonids above each culvert. However, these culverts impede passage at various times of the year through a combination of excessive gradient, undersized to pass high flows, or being “perched” above the stream surface more than 4 inches. Habitat connectivity can be increased by removing or replacing these culverts.

Grazing can also be a source of sediment to streams and effects to riparian areas in the LJCRP area through several means: 1) trampling soft soils in streamside wetland areas, which compacts them and also retards or impedes vegetative growth; 2) breaking down stream banks and widening the stream channel through erosion of the stream bank pieces, which end up in the creek; and 3) over-browsing riparian vegetation, from grass to forbs to shrubs, which then do not protect the soil as well from the erosive power of raindrops and overland flow. Grazing effects are mitigated by controlling livestock numbers, limiting season of use, setting utilization standards and by dispersing animals across the range. These management options are not within the scope of this project.

Fine sediment inputs to streams can also come from overland flow across adjacent burned areas. There were no burned areas in the LJCRP area which might have contributed to overland flow.

**Table 25. Salmonid fish species and age class blocked by culverts and miles of habitat blocked.**

Stream Name Location	FS Road Number	Fish Species	Adult/Juvenile Passage Barrier	Miles of Habitat Blocked
Broady Creek	4600505	ST,RT	juvenile and adult	3.0
WF Broady Creek	4600505	ST, RT	juvenile and adult	2.5
WF Broady Creek Trib	4600505	ST, RT	juvenile and adult	0.5

Stream Name Location	FS Road Number	Fish Species	Adult/Juvenile Passage Barrier	Miles of Habitat Blocked
EF Broady Creek	4600505	ST, RT	juvenile and adult	2.0
Davis Creek	4602120	ST,RT	juvenile and adult	3.5
Sumac Creek	4600190	ST,RT	juvenile and adult	1.0

ST=Steelhead, RT=redband trout

## Riparian vegetation

Road construction, culverts, grazing, the absence of beaver are all factors contributing to hydrologic changes that alter the speed and shape of stream flow, and consequently riparian vegetation composition.

Riparian forests provide large woody debris (LWD) and moderate stream water temperature, both of which are important fish habitat features. LWD provides cover for fish and increases hydraulic diversity and habitat complexity and pools (Bryant 1983, Bisson et al. 1987). Increased water temperatures can affect or influence the physiology, behavior, and distribution of salmonid fish and can interact with other stressors affecting salmonids (US Environmental Protection Agency 2001(Teply and Dale McGreer 2014)). Riparian shrubs, such as willow species, and riparian sedges provide streambank stabilization, as well as shading stream margins. Sedge species such as *Carex aquatilis* and *C. utriculata* have strong and long rhizomes which actually reach across small streams, essentially knitting the banks together (Wilson 2008). Shade intolerant willows can be found on stream margins in openings, forming dense stands whose stems and roots hold streambanks and sediment (Crowe and Clausnitzer 1997).

Fluvial morphology expressed using Rosgen stream classification (Rosgen 1996) was used in the development of wetland and riparian plant associations in the Blue Mountains (Crowe and Clausnitzer 1997, Wells 2006). Preliminary landform keys are included in both Crowe and Clausnitzer 1997 and Wells 2006. While largely untested, landform keys give a general idea of expected vegetation by landform and Rosgen channel types. In LJCRP, stream gradients on plateaus average less than four percent. The streams are Rosgen B, C, or G channels. On the breaklands, stream gradients exceed 10 percent. These Rosgen A and A+ channels are very efficient at moving water and sediment to valley stream systems. In the valley bottoms, channel gradients drop to less than two percent. Here Rosgen type C and E channels are common. Rosgen G and F channels can be found where channel modifications have occurred (WWNF WMO, 2010).

In general, broad channel types with low gradients (2% or less), Rosgen C and E channels, have sedge and willow communities where soil is saturated most of the year. On drier soils (terraces) forested communities such as ponderosa pine/ common snowberry grow. Degraded C and E channels are frequently occupied by Kentucky bluegrass. In cold air drainages lodgepole occupy the riparian/upland interface with individuals and clumps in the riparian area where soils are not saturated.

Narrow to moderately wide V channels or trough shaped valleys with moderate gradients (2 to 4%), Rosgen B channels, tend to have mountain alder communities along streambanks and floodplains with ponderosa pine/common snowberry or Douglas-fir/common snowberry plant associations. Narrow V shaped channels with high gradients (>4%), Rosgen A channels, also have mountain alder communities.

Riparian areas and the RHCAs that are delineated as areas of influence are managed through a set of desired condition statements and riparian management objectives (RMOs; see Table 10, Chapter 1). Treatment of RHCAs is guided by these and site specific stand data collected through the planning of the LJCRP. The site specific data that is available is primarily for Category 4 streams in the project area. Some limited site specific data is available for the RHCAs of Swamp Creek.

The total acres of RHCAs in each of the three categories are displayed by subwatershed within the Upper and Lower Joseph Creek watersheds in Tables 26 - 27, respectively. There is limited stand data on RHCAs in the project area. Some information exists on Category 4 RHCAs but is limited to the adjacent upslope stand information. For the LJCRP the assumption is that for Category 4 RHCAs the stand data for the adjacent stand would be very similar to the RHCA vegetation.

**Table 26. Acres of RHCA category by subwatershed within the Upper Joseph Watershed by subwatershed**

Subwatershed Name	Category 1 RHCAs (acres)	Category 1 RHCAs (acres)	Category 2 RHCAs (acres)	Category 2 RHCAs (acres)	Category 4 RHCAs (acres)	Category 4 RHCAs (acres)
	<b>Total</b>	<b>FS</b>	<b>Total</b>	<b>FS</b>	<b>Total</b>	<b>FS</b>
Broadly Creek	875	587	143	143	1,407	1,085
Horse Creek	713	411	132	47	2,356	1,115
Rush Creek	1,174	108	464	215	2,178	552
Lower Cottonwood Creek	867	169	224	173	1,583	816
Upper Cottonwood Creek	806	716	130	130	2,179	1,996
Peavine Creek	997	643	166	166	1,698	1,276
<b>Total:</b>	<b>5,432</b>	<b>2,634</b>	<b>1,259</b>	<b>874</b>	<b>11,401</b>	<b>6,840</b>

**Table 27. Acres of RHCA category by subwatershed within the Lower Joseph Watershed by subwatershed**

Subwatershed Name	Category 1 RHCAs (acres)	Category 1 RHCAs (acres)	Category 2 RHCAs (acres)	Category 2 RHCAs (acres)	Category 4 RHCAs (acres)	Category 4 RHCAs (acres)
	<b>Total</b>	<b>FS</b>	<b>Total</b>	<b>FS</b>	<b>Total</b>	<b>FS</b>
Cougar Creek	869	713	155	155	1,596	1,578
Sumac Creek	826	293	152	134	1,032	945
Lower Swamp Creek	1,550	1,144	137	113	2,667	1,822
Davis Creek	883	715	0	0	1,205	907
<b>Total:</b>	<b>4,128</b>	<b>2,865</b>	<b>444</b>	<b>402</b>	<b>6,500</b>	<b>5,252</b>

Olson (2000) found fire occurrence in riparian zones to be only slightly less frequent than on adjacent uplands in similar forest types in the Blue Mountains in Oregon (Wright and Agee 2004). As Olson noted in her thesis: “Keeping fire out of the ecosystem will not only continue to alter the structure and vegetation composition of these riparian forests, but will also allow the buildup of fuels that could result in unprecedented fire intensities, and subsequently higher fire severities, than were present in the system historically. If the goal of forest management is to restore historical disturbance regimes to these forests, results from this study indicate riparian forests should be managed according to the historical fire regime of the forest type rather than distance from a stream” (Olson 2000) (in this context, “distance from a stream” refers to a process of using designated buffer widths (in feet), varying by stream class, to establish riparian habitat conservation areas).

## Air Quality

The Clean Air Act requires that the Environmental Protection Agency (EPA) establish standards for certain pollutants in order to protect human health and welfare. National Ambient Air Quality Standards (NAAQS) have been established (Table 28). Particulate matter is the primary pollutant of concern in smoke management. Particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>) or less than 10 microns in diameter (PM<sub>10</sub>) describes particles small enough to enter the human respiratory system.

**Table 28 describes the NAAQS levels described in terms of PM<sub>10</sub> and 2.5.**

Pollutant	Averaging Period	Primary NAAQS
PM 10	Annual arithmetic mean	n/a
	24-hour	150 µg/m <sup>3</sup>
PM 2.5	Annual arithmetic mean	15 µg/m <sup>3</sup>
	24-hour	35 µg/m <sup>3</sup>

Air quality monitoring sites are located in LaGrande, Cove, and Baker City, Oregon. These sites maintain equipment that provides estimates for PM<sub>10</sub> and PM<sub>2.5</sub> levels for health purposes. Visual quality is monitored from an automated IMPROVE (Integrated Monitoring for Protected Visual Environments) site located within Starkey Experimental Forest.

Smoke generated from wildfire would continue to increase as the landscape further departs from reference conditions and fuel loadings increase and become more continuous across the LJCRP area. There are two areas of concern due to smoke impacts: the town of Enterprise, Oregon which is an identified smoke sensitive receptor area and the Eagle Cap Wilderness which is identified as a Class 1 Airshed.

Local research indicates that PM<sub>10</sub> production due to wildfire is approximately twice that produced in a prescribed fire (Huff 1995).

All burning would be conducted in compliance with Oregon DEQ requirements and applicable agreements. Burns will be registered, planned, accomplishment reported, and monitoring conducted as specified in the Oregon Smoke Management Plan (OAR 629-048, 2008). Burn plans will address smoke management concerns and requirements.

## The biological environment

### Vegetation and disturbance regimes

The following are analysis topics and corresponding indicator specific to the vegetation resource and disturbance regimes (fire, insects and disease). These analysis topics will be tracked throughout the effects analysis in order to address whether, or to what degree, the project meets purpose and need objectives.

Forested Vegetation – Percent Departure from RV:

- Forested tree cover type
- Indicator: percent of upland forest potential vegetation group in each forest cover type
- Forested structural stages
- Indicator: percent of upland forest potential vegetation group in each forested structural stage
- Forested tree density class

Indicator: percent of upland forest potential vegetation group in tree density classes

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#### Forested Vegetation – Forest Pattern Similar to Historic Fire Regime

- Heterogeneous mosaic of tree clumps, individual trees, and openings

Indicator: percent of forested landscape treated with ICO prescription

#### Forested Vegetation – Large Trees

- Tree size class distribution

Indicator: tree size class distribution by upland forest potential vegetation group

#### Insects and Disease Susceptibility – Departure from RV (Schmitt and Powell 2008, Powell 2010)

- Insect and disease susceptibility rating (Schmitt and Powell 2005)

Indicator: percent of upland forest potential vegetation group by susceptibility rating

#### Timber resource:

- Acres of harvest treatment
- Indicator: acres treated that remove timber volume
- Timber volume

Indicator: timber volume removed as a result of restoration treatment

#### Wildland Fire Regime:

- Fire Regime

Indicator: Fire Regime departure from desired extent (6 – 15% per year) and desired severity

- Fire Management Decision Space

Indicator: Relative description of how wildland fire (planned or unplanned ignition) may be managed to meet resource objectives. Indicator is based on movement of the landscape toward natural disturbance regimes that promote typical fire severity and reference landscape conditions.

The Lower Joseph Creek watershed currently supports a mix of forests, ponderosa pine savannas, and grasslands. This mix of vegetation types has varied in relative abundance through time for tens of thousands of years (Mehring 1996). Range of variation (RV) analysis is an analytical technique to characterize inherent variation in the composition, structure, and density of vegetation, reflecting recent evolutionary history and the dynamic inter-play of biotic and abiotic factors. “Study of past ecosystem behavior can provide the framework for understanding the structure and behavior of contemporary ecosystems, and is the basis for predicting future conditions” (Morgan et al. 1994). The historical range of variation (HRV) is meant to reflect ecosystem properties free of major influence by Euro-American humans, providing insights into ecosystem resilience (Kaufmann et al. 1994, Landres et al. 1999). RV helps us understand what an ecosystem is capable of, how historical disturbance regimes functioned, and inherent variation in ecosystem conditions and processes – the patterns, connectivity, seral stages, and cover types produced by ecological systems at a landscape scale. Ecosystems of the LJCRP developed with wildfire, insect outbreaks, disease epidemics, floods, landslides, human uses, and weather cycles. Change was, and still is, constant in their development, and HRV is designed to characterize the range of vegetation composition, structure, and density produced by these agents of change (Morgan et al. 1994), as well as other constraints like soils, topography, temperature, moisture, and others. Powell (2010) synthesizes literature and information on ranges of variation for Blue Mountains ecosystems, and represents the best available science for defining the characteristics of resilient ecosystems for the LJCRP.

Table 2 (Chapter 1) summarizes the extent of major vegetation types (potential vegetation groups) in the project area. Potential vegetation groups are aggregations of plant associations found in the Blue Mountains (Johnson 1987, Powell and C.G. Johnson 2007) and represent a combination of temperature and moisture regimes. Given that plant associations are considered to be fairly homogeneous in terms of their growing environments, it is also assumed that potential vegetation groups will generally respond to management in a similar manner. Within each potential vegetation group, historical fire return intervals and severities vary, depending on several factors, such as fuel loadings, aspect, elevation, and weather conditions before and during fires (Heyerdahl 1997). Insect and disease frequencies and severities also vary, depending on species, vegetation density, and environmental factors. Approximately 40 plant associations were grouped into plant association groups (PAG), and potential vegetation groups (PVG) following procedures from Powell et al. (2007).

Potential vegetation groups (PVGs) of the LJCRP are almost equally split between grasslands and forests. Approximately 75% of the forests are dominated by the dry upland forest PVG, and 25% by the moist upland forest PVG. Dry upland forests are located at low to moderate elevations, and were historically dominated by ponderosa pine and Douglas-fir cover types (Table 29). Cover types<sup>9</sup> classify existing vegetation composition (Eyre 1980, Shiflet 1994), reflect majority or plurality tree species abundance, and apply to both pure and mixed stands. Compared to RV estimates, ponderosa pine is underrepresented in the dry PVG, while Douglas-fir, grand fir and lodgepole pine are overrepresented. In the moist PVG, lodgepole pine is underrepresented and Douglas-fir and grand fir are overrepresented. All other cover types are within RV estimates.

Dry upland forests were historically characterized by predominantly frequent, low severity surface fires occurring at intervals of less than 20 to 25 years (Barrett et al. 1997). While larger-diameter, old trees typically survived these low severity fires, younger, smaller-diameter trees and less fire-tolerant species were killed. The historical fire regime created and maintained a generally open forest structure, with a small-scale mosaic pattern of clumps or patches of trees dominated by large diameter, old ponderosa pines, scattered individual trees, and openings that contained an abundance of native grasses and shrubs (Franklin et al. 2008, Larson and Churchill 2012, Churchill et al. 2013). This spatial heterogeneity is a key structural element of the historical dry upland forest (Franklin et al. 2008). Crown fires may have occurred historically in mid- to late-seral closed canopy structural stages. However, these events were limited in extent due to the predominance of open canopy forest (Barrett et al. 2010). The frequent fires in the dry upland forest potential vegetation group also contributed to relatively low fuel loadings.

The moist upland forest PVG is dominated by Douglas-fir, western larch, western white pine, grand fir, and sub-alpine fir (Table 29), and generally located at moderate elevations. It is characterized by mixed-severity fires occurring every 40 to 100 years. In a mixed-severity fire regime, fire severity ranges from stand-replacing crown fires that kill greater than 75% of overstory leaf cover to nonlethal, low-intensity surface fires that kill less than 25% of the overstory, or lack of fire that leave patches of living trees (e.g., as can currently be seen along parts of Cold Springs road). According to Perry et al. (2011), mixed-severity fires create a patchiness of forest structure, composition, and seral status that can be observed and quantified at an intermediate or meso-scale, with patch sizes ranging from a few hundredths up to tens or hundreds of acres, depending on locale and climatic drivers. Hessburg et al. (1999) measured patch sizes of uniform structure and composition from historic aerial photography from the 1930s for the ecological subregion including the LJCRP, and found patch sizes for moist (and dry) upland forests to range from approximately 10 to 600 acres. While forest management likely had affected vegetation pattern by the 1930s, it is the best source of data available on historic forest pattern. In forest types that were historically dominated by mixed-severity fire regimes, surface and canopy fuels, topography, climatic conditions, and ignitions worked in concert to influence variation in fire frequency, severity, spatial extent, and seasonality. The result was a complex spatial-temporal mix of low, moderate, and high

<sup>9</sup> For the LJCRP, cover types were calculated using a three-step process described in Powell (2004, page 14).



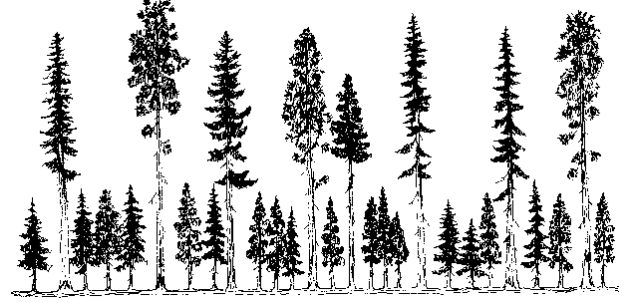
severity patches. Due to patterns of burning, this type of historical fire regime created a complex mosaic pattern across the landscape, resulting in high levels of diversity in both plants and animals (Perry et al. 2011).


**Table 29. Current forest cover type distribution for the Lower Joseph Creek Restoration Project, and the natural range of variation in cover types for the Blue Mountains**

Potential Vegetation Group	Cover Type	Acres	Percentage of Potential Vegetation Group	Range of variation (%) (Powell 2010)
Dry upland forest (UF)	Ponderosa pine	11,921	28%	50-80
Dry upland forest (UF)	Douglas-fir	21,773	51%	5-20
Dry upland forest (UF)	Western larch	572	1%	1-10
Dry upland forest (UF)	Lodgepole pine	217	1%	0
Dry upland forest (UF)	Grand fir	7,464	18%	1-10
Dry upland forest (UF)	Engelmann spruce	22	0%	0
Dry upland forest (UF)	Unknown	438	1%	
Dry UF Total		42,407	100%	
Moist upland forest (UF)	Ponderosa pine	1,428	11%	5-15
Moist upland forest (UF)	Douglas-fir	5,878	45%	15-30
Moist upland forest (UF)	Western larch	583	4%	10-30
Moist upland forest (UF)	Lodgepole pine	219	2%	25-45
Moist upland forest (UF)	Grand fir	4,653	36%	15-30
Moist upland forest (UF)	Engelmann spruce	133	1%	1-10
Moist upland forest (UF)	Unknown	64	0%	
Moist UF Total		12,958	100%	
Grand Total		55,365		

### *Forest structure*

The basis for the forest structure classification system used in the Blue Mountains is the four stage system that was developed for conifer forests located west of the Cascade Mountains (Oliver and Larson 1996). This system was expanded to an eight class system to include a wider spectrum of structural variation that exists within the drier eastside forests of Oregon and Washington (O'Hara et al. 1996). Figure 5 illustrates and describes the forest structural stages for this analysis.

Description of forest structural Stages	
	<p><b>Stand Initiation (SI).</b> Following a stand-replacing disturbance such as wildfire or tree harvest, growing space is occupied rapidly by vegetation that either survives the disturbance or colonizes the area. Survivors literally survive the disturbance above ground, or initiate new growth from their underground organs or from seeds on the site. Colonizers disperse seed into disturbed areas, it germinates, and then new seedlings establish and develop. A single canopy stratum of tree seedlings and saplings is present in this stage.</p>
	<p><b>Stem Exclusion (SE).</b> In this structural stage, trees initially grow fast and quickly occupy all of their growing space, competing strongly for sunlight and moisture. Because trees are tall and reduce light, understory plants (including smaller trees) are shaded and grow more slowly. Species needing sunlight usually die; shrubs and herbs may go dormant. In this stage, establishment of new trees is precluded by a lack of sunlight (<b>stem exclusion closed canopy</b>) or by a lack of moisture (<b>stem exclusion open canopy</b>).</p>
	<p><b>Understory Reinitiation (UR).</b> As the forest develops, a new age class of trees (cohort) eventually gets established after overstory trees begin to die or because they no longer fully occupy their growing space. Regrowth of understory seedlings and other vegetation then occurs, and trees begin to stratify into vertical layers. This stage consists of a low to moderate density overstory with small trees underneath.</p> <p><b>Young Forest Multi-Story (YFMS).</b> As succession progresses, three or more tree layers have become established as a result of minor disturbances (including tree harvest) that cause progressive but partial mortality of overstory trees, thereby perpetuating a multi-layer, multi-cohort structure. This class consists of a broken overstory layer with a mix of sizes present (large trees are scarce); it provides high vertical and horizontal diversity.</p>

Description of forest structural Stages	
	<p><b>Old Forest (OF).</b> Many age classes and vegetation layers mark this structural stage containing large, old trees. Snags and decayed fallen trees may also be present, leaving a discontinuous overstory canopy. The drawing shows a single-layer stand of ponderosa pine reflecting the influence of frequent surface fire on dry-forest sites (<b>old forest single stratum; OFSS</b>). Surface fire is not as common on moist sites or common on cold sites, so these areas generally have multi-layer stands with large trees in the upper-most stratum (<b>old forest multi strata; OFMS</b>).</p>

**Figure 5. Description of forest structural stages.**

Sources: Based on O'Hara and others (1996), Oliver and Larson (1996), and Spies (1997).

Table 30 summarizes the existing forest structural stage percent and the estimated RV percent by potential vegetation group. Overall, the OFSS stage is rare and extremely underrepresented in the dry PVG while the OFMS and UR stages are overrepresented in both PVGs. The SE and SI stages are close to or within RV.

**Table 30. Distribution of forest structural stages in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Structural Stage	Acres		Percentage of Potential Vegetation Group		Range of variation (%) (Powell 2010)
Dry UF	OFSS	188		0%		40-60
Dry UF	OFMS	8334		20%		5-15
Dry UF	YFMS	3427	19165	8%	45%	5-10
Dry UF	UR	15738		37%		
Dry UF	SE	7518		18%		10-20
Dry UF	SI	7018		17%		15-25
Dry UF	Unknown	184		0%		
<b>Dry UF Total</b>		<b>42407</b>		<b>100%</b>		
Moist UF	OFSS	36		0%		10-20
Moist UF	OFMS	3919		30%		15-20
Moist UF	YFMS	1976	4626	15%	36%	10-20
Moist UF	UR	2650		20%		
Moist UF	SE	2343		18%		20-30
Moist UF	SI	2011		16%		20-30
Moist UF	Unknown	23		0%		
<b>Moist UF Total</b>		<b>12958</b>		<b>100%</b>		
<b>Grand Total</b>		<b>55365</b>				

**Tree Density Class**

Tree density is a characterization of tree stocking for an area. It expresses the number of tree stems occupying a unit of land. Stocking can be expressed as a “stand density index” or in some other measure of relative density, or it can be quantified in absolute terms as a number of trees per acre or as the amount of basal area, wood volume, or canopy cover on an area (Powell 1999, 2013)).

Published stocking guidelines are available for evaluating tree density levels (Cochran et al. 1994, Powell 1999, 2009). By using the stocking guidelines in conjunction with potential vegetation groups, it is possible to estimate how much forest-land acreage is currently overstocked and how it compares to a range of variation for this ecosystem component.

Currently in the dry PVG, the high density class is overrepresented, the moderate density class is close to RV and the low density class is underrepresented. For the moist PVG, high is overrepresented and the moderate and low classes are within RV (Table 31).

**Table 31. Distribution of tree density classes in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Tree Density Class	Acres	Percentage of Potential Vegetation Group	Range of variation (%) (Powell 2010)
Dry UF	Dry High	14182	33%	5-15
	Dry Mod	13673	32%	15-30
	Dry Low	14346	34%	40-85
	Unknown	206	0%	
Dry UF Total		42407	100%	
Moist UF	Moist High	5821	45%	15-30
	Moist Mod	3676	28%	25-60
	Moist Low	3260	25%	20-40
	Unknown	201	2%	
Moist UF Total		12958	100%	
Grand Total		55365		

**Size Class Distribution**

Tree size class is a diameter range characterizing a stands predominant situation with respect to tree size using diameter at breast height. For this analysis, size class represents the upper (overstory) size class meeting the minimum canopy cover threshold (10% for >20” and 20% for <20”). Within multi-age class structural stages (OFMS, YFMS, UR), it is estimate of the largest overstory tree size while for single age class structural stages (SI, SE, OFSS) it is an estimate of the overall average tree size. Tree size class can be a general indication of site productivity, tree age (young, mature, old) and structural stage as well as habitat suitability.

Reference conditions for tree size class are related to, but not the same as those for structural stage. State-and-transition modeling was used to estimate the relative abundance of 5” tree size classes given historical disturbance regimes (Appendix C). Across all PVGs, the HRV for size classes were modeled to be: <5” dbh: 23% of the forested area; 5-10” dbh: 14%; 10-15” dbh: 20%; 15-20” dbh: 17%; >20” dbh: 26%. Current size class distribution within the project area (Table 32) is dominated by the 10-15 and 15-20 inch diameter classes (66 percent of dry and 55 percent in moist). This is consistent with the cessation of natural fires approximately 100 years ago and the growth of trees that have regenerated since the time of cessation. The large tree (>20) size class represents sixteen percent of the dry PVG and twenty three

percent of the moist. These percentages are largely due to the historic removal of the large tree component as well as the stand replacing fire events that occurred within the project area in the 1980s. One would expect a higher percentage in both PVGs to coincide with the old forest (OF) structural stage RV.

Forest thinning prescriptions would follow a practical, science based approach intended to restore characteristic functionality, and resistance and resilience to disturbance. Known as “ICO” (individuals, clumps and openings), this approach uses historical information at the stand- and landscape-level to design restoration strategies and prescriptions for restoration (e.g., see (Franklin et al. 2013a)). For example, the pattern of old trees, stumps and snags currently on the landscape provide indicators of natural tree clumping and spacing, and thus the degree of horizontal spatial heterogeneity. In places where legacies of historic forest patterns are absent (e.g., young, post-fire forests), information is used from similar habitats.

**Table 32. Tree size class distribution in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Tree Size Class (diameter range in inches)	Acres	Current percentage of Potential Vegetation Group
Dry upland forest (UF)	<5	7,025	17%
	5-10	803	2%
	10-15	15,975	38%
	15-20	11,754	28%
	>20	6,666	16%
	Unknown	184	<1%
Dry UF Total		42,407	100%
Moist upland forest (UF)	<5	2,011	16%
	5-10	783	6%
	10-15	3,526	27%
	15-20	3,583	28%
	>20	2,991	23%
	Unknown	64	<1%
Moist UF Total		12,958	100%
Grand Total		55,365	

Early logging on forest service lands was focused on removal of commercially valuable stands of old ponderosa pine (Munger 1917, Griffin 1918, Matz 1928). Generally, this caused replacement of stands of slower growing, old ponderosa pine with young, faster growing stands. Additionally, as the more drought tolerant and shade intolerant ponderosa pine was harvested, it was replaced in many areas by less drought tolerant species that are more shade tolerant, such as grand fir and Douglas-fir. The more open, single-storied ponderosa pine stands were converted to multi-storied stands. As stand densities increased and species compositions and forest structures were altered, the frequency and intensity of insect outbreaks increased. Under Blue Mountains’ normal moisture-limited conditions, densely-stocked stands of grand fir and Douglas-fir trees become stressed, increasing their vulnerability to insect infestation. Similarly, on pine sites, multi-storied, densely stocked ponderosa pine stands are at risk of insect infestation under drought conditions. As these densely stocked and moisture-stressed stands became more abundant during the last half of the 20th century, localized insect infestations quickly blossomed into outbreaks covering thousands of acres (Gast et al. 1991, Spiegel and McWilliams 2014). Insects which attack Douglas-fir and grand fir include western spruce budworm (*Choristoneura occidentalis*), Douglas-fir tussock moth (*Orgyia pseudotsugata*), Douglas-fir beetle (*Dendroctonus pseudotsugae*), and fir engraver (*Scolytus ventralis*). Although insect outbreaks likely occurred prior to the time of the first Euro-American settlers,

the frequency and size of outbreaks caused by western spruce budworm species and possibly other insects that attack Douglas-fir and grand fir appear to have increased as a result of the proliferation of fir-dominated forests (Swetnam et al. 1995)(Spiegel and McWilliams 2014). Similarly, the multi-storied ponderosa pine stands that replaced the single-storied stands on pine sites have also increased the potential for outbreaks of the western pine beetle (*Dendroctonus brevicomis*) and mountain pine beetle (*D. ponderosae*) (Hessburg et al. 1994, Spiegel and McWilliams 2014). During the past 50 years, tree mortality from insect disturbances in some stands has exceeded 80 percent of all overstory trees (Swetnam et al. 1995). Several large-scale insect outbreaks, including spruce budworm, spruce bark beetle, and Douglas-fir tussock moth, occurred from the 1970s to the 2000s and caused extensive defoliation and mortality. Most tree diseases are increasing in occurrence and severity due to changes in tree species composition (increased grand fir within the dry upland forest PVG), stand structures (increases in multi-storied structure), and increased stocking levels (Scott and Schmitt 1996). Although each outbreak was followed by an effort to salvage dead trees, low merchantability and limited access prevented removal of dead trees from many areas. The abundance of insect-killed trees substantially increased the surface fuel loads for thousands of acres across the Blue Mountains. Conditions became conducive for the occurrence of large, high-intensity wildfires. From 1985 until 1994, lightning-caused wildfires burned more than 445,000 acres in the Blue Mountains. Many of these fires were high severity, stand-replacing events that killed most of the trees across large areas. Within the project area, two notable wildfire events have occurred within the last 30 years. The 1986 Joseph Canyon/Starvation Ridge fire burned over 40,000 acres within the project area and the 1988 Tepee Butte burned almost 60,000 acres of which 1/3 was in the project area. A high percentage of these fires were stand replacing and resulted in the stand initiation phase of succession. Since 2004, three wildfire events occurred within the project area, burning a total of approximately 23,750 acres.

As a consequence of the past history of timber harvest, fire suppression, and grazing, the forests within the LJCRP are moderately different from those that existed a century ago (Munger 1917). Open, single-storied ponderosa pine stands have decreased, while dense, multi-storied stands of Douglas-fir and true fir have increased. Today, more stands are dominated by a uniform distribution of young to mid-aged trees as a result of selective harvesting of larger trees, salvage logging, and regeneration harvests that followed insect and fire mortality. The risk of insect outbreak has increased due to an abundance of densely stocked mixed-species stands. The probability of large, high-severity wildfire has also increased due to the increase in insect-induced tree mortality, increased fuel loadings, and the large more homogenous acreage of densely stocked, multi-storied stands composed of shade-tolerant and fire-intolerant tree species.

### *Disturbance regimes*

This section describes the affected environment related to insects, disease, and wildland fire and their contribution to ecological resilience. Resilience is defined as the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change (FSM 2020.5). An ecologically resilient landscape is less susceptible to uncharacteristic wildfire (Averill et al. 1995, Gunderson 2000, Walker et al. 2004), is at lower risk from uncharacteristic insect and disease infestations and epidemics, provides a full range of habitats for native terrestrial and aquatic species, protects water quality and abundance, provides a full range of habitats for native terrestrial and aquatic species, protects water quality and abundance, provides a full range of uses, products and services, and is more adaptable to changes in climate.

Disturbance processes including fire, insects, diseases and wind, were, and continue to be significant drivers of ecosystem resilience (Agee 1993, Agee and Maruoka 1994) and agents of change in vegetation structure, composition, density, and pattern. Wildland fire is critical to ecological restoration of fire adapted systems and can be used as a tool to manage natural resources. The influence of these disturbance processes can provide ecological benefit as well as impacts.

A fire regime is a generalized description of the role fire plays in the ecosystem (Agee 1993). It includes characteristics of frequency, severity, and seasonality of fire. The historical fire regime is described according to fire severities that occurred before significant European influence began in approximately 1850 (Jaindl and Quigley 1995) and includes fire ignited by Native Americans. Fire regimes, especially fire frequency and intensity, strongly influence which species will prevail in the vegetation composition of a given area, along with biophysical conditions. Fire has been a significant process within the LJCRP area historically and is essential to proper ecosystem function. Management can mimic the effects of fire through actions such as timber harvest, prescribed fire, or managing wildfire but not always at the same frequency or scale as the historical disturbance regime. Land managers have the ability to choose, to some extent, what relationship with fire is desirable (Agee and Maruoka 1994). Table 33 describes fire regimes grouped into classes of frequency and severity.

**Table 33. Description of fire regime groups (from Barrett et al 2010).**

Fire Regime Group	Frequency (years)	Severity	Severity Description
I	0 - 35	Low / Mixed	Generally low-severity fires replacing less than 25% of the dominant overstory vegetation; can include mixed-severity fires that replace up to 75% of the overstory
II	0 - 35	Replacement	High-severity fires replacing greater than 75% of the dominant overstory vegetation
III	35 - 200	Mixed / Low	Generally mixed-severity; can include low severity fires
IV	35 - 200	Replacement	High-severity fires
V	200+	Replacement / any severity	Generally replacement-severity; can include any severity type in this frequency range

### *Fire Regime Departure*

Hann et al. 2003 described amount of departure (percent) from historical fire regime and vegetation conditions through the fire regime condition class tool. This tool was developed to compare historic natural vegetation, associated disturbance regimes, and current vegetation succession classes to identify the amount of departure from historical conditions. This analysis will utilize departure versus the simplified condition classes; however the underlying principles are utilized to describe departure from vegetative range of variability and historic disturbance regime when compared to existing landscape condition. The larger the departure percent indicates a greater need for ecological restoration of disturbance processes and vegetation management.

The existing condition and successional trends in vegetation in the LJCRP is similar to those described for the larger interior Columbia River basin (Quigley et al. 1996). Data shows that the Blue Mountains are dominated by upland forest ecosystems that evolved with frequent fire, low and mixed severity fire; the LJCRP is likewise dominated by this type of disturbance frequency and severity. The non-forest areas within the Joseph Creek project historically supported frequent fire with mixed to replacement severity fire. Much of the Lower Joseph project area is characterized by low to moderate departure from historical conditions.

### *Insects and Disease*

Ecosystem management and restoration strives to maintain an endemic level of insects and disease disturbance consistent with historical levels of activity within the range of variability for those plant communities providing resilience and adaptability for those systems. Insects and disease activity are important disturbance processes that create snags and down logs in the forested system. Trees with decay and mistletoe infestations provide habitat for a variety of forest-dwelling flora and fauna including microbes, fungi, invertebrates, small animals, and cavity nesting birds. During the past several decades, it has become increasingly more common for levels of insect and disease created disturbance to exceed pre-settlement conditions (Scott and Schmidt 1996). Campbell (1996) observed the following broad scale trends in the Blue Mountains that are applicable to the LJCRP area.

- Outbreaks of defoliating insects, such as western spruce budworm and Douglas-fir tussock moth, are now larger, more intense, and more frequent than in the past.
- Bark beetle related mortality, associated with tree stress and overstocked stands, is more prevalent.
- Drought in the late 1980s and early 1990s, coupled with overstocked stands, has contributed to increased mortality from bark beetles, other insects, fire, and disease.
- Many root diseases and dwarf mistletoes are more widespread and severe because of past management and the resulting change in forest structure and composition.

Insect and diseases common within the project area include:

Defoliators – Douglas-fir tussock moth (*Orgyia pseudotsugata*) and western spruce budworm (*Choristoneura occidentalis*) are evaluated together as a defoliators group. Several large-scale outbreaks of both species have occurred within the Blue Mountains from the 1970s to the 2000s and caused extensive defoliation.

The Douglas-fir tussock moth is a native defoliator of conifers (Douglas-fir and true firs) in western North America. Usually the first indication of attack appears in late spring. Larvae from newly hatched eggs feed on current year's foliage, causing it to shrivel and turn brown. By mid-July they may feed on both current and old foliage, although current needles are preferred. Defoliation occurs first in the tops of trees and the outermost portions of the branches, and then in the lower crown and farther back on the branches

Western spruce budworm is a small native moth that feeds in the caterpillar stage on buds and developing conifer needles. In the Blue Mountains it feeds primarily on grand fir and Douglas-fir but will also feed on western larch, Engelmann spruce, and subalpine fir. The larvae feed on developing foliage in the early summer. Because current year growth is primarily consumed, it takes several years of defoliation for long-term impacts to occur. Areas within the LJCRP area did suffer impacts from a western spruce budworm epidemic that occurred within the Blue Mountains from about 1985 to 1993. Stands with Douglas-fir and grand fir with older dead tops and dead firs on the ground are evidence of prior budworm damage (Spiegel and McWilliams 2014).

Conifer forests with high susceptibility to defoliating insects are typically characterized as having low precipitation and persistent droughty conditions, a high proportion of host tree species, and a multi-layered canopy structure (Gast et al. 1991, Hessburg et al. 1999). Within the project area, the risk of budworm and Douglas-fir tussock moth outbreaks is currently higher than historically due to the presence of more host trees, primarily Douglas-fir and also grand fir, and dense, multilayered stands. Without management, these stands will continue to increase in density and stocking of shade-tolerant firs, increasing their risk to western spruce budworm and Douglas-fir tussock moth defoliation, damage, and mortality (Spiegel and McWilliams 2014).

Douglas-fir beetle – Douglas-fir beetle (*Dendroctonus pseudotsugae*) is the most destructive bark beetle pest of Douglas-fir. In the Blue Mountains, Douglas-fir is the principle host of the Douglas-fir beetle, although rarely, western larch is attacked. Douglas-fir beetle outbreaks are often associated with defoliator events, drought, fire or wind damage, old and diseased stands, and high stocking levels (Gast et al. 1991; Hessburg et al. 1999). Where such susceptible trees are abundant, once they have been infested and killed, beetle populations can build up rapidly and spread to adjacent green, standing trees. Damage is greatest in dense stands of mature Douglas-fir. Douglas-fir dominated stands and dry mixed-conifer stands with an interior Douglas-fir component are most likely to host Douglas-fir beetle outbreaks. Populations of Douglas-fir beetles are currently high on the Wallowa-Whitman and continued mortality is expected from this beetle while stands remain overstocked and droughty conditions continue (Spiegel and McWilliams 2014). See table 34 for extent of recent Douglas-fir beetle activity within the project area.

Fir engraver – The fir engraver beetle (*Scolytis ventralis*) is the most important bark beetle of true firs in the Blue Mountains. It attacks and kills trees of nearly all age classes, from pole size to mature sawtimber (Gast et al. 1991). In addition to infesting standing green trees, the fir engraver will attack freshly cut logs and recent windthrows.

Elevated fir engraver beetle susceptibility is often associated with mixed conifer plant communities having a substantial component of grand fir and experiencing defoliator damage, drought, high stand density or root disease infestations (Gast et al. 1991; Hessburg et al. 1999). The extent of recent fir-engraver activity within the project area is listed in table 34.

Bark beetles in ponderosa pine – The mountain pine beetle (*Dendroctonus ponderosae*) can reproduce in all species of pine within their range. Attacks by this beetle have also been associated with increased intertree competition and drought. In the 1970's the Blue Mountains experienced a widespread mountain pine beetle (*Dendroctonus ponderosae*) outbreak that resulted in the mortality of much of the older (over about 80 years old) lodgepole pine and some of the ponderosa pine as well. Within the project area, trees on the ground have been observed that show characteristic mountain pine beetle galleries and are evidence of this past outbreak (Spiegel and McWilliams 2014). The Blue Mountains are currently experiencing another mountain pine outbreak. Again, they are killing most of the lodgepole trees over about 80 years old, and ponderosa pine in overstocked stands as well. There is currently some mountain pine beetle activity in the pines within the project area (Table 34) and it can be expected to continue for several years where current ponderosa pine and lodgepole pine stand densities are above recommended densities (Spiegel and McWilliams 2014). For ponderosa pine, recommended stocking levels would be at or lower than the basal area for the Lower Management Zone by plant association as determined by Cochran et al. (1994) and Powell (1999). These recommendations are especially relevant to parts of the project area that, under a changing climate, can no longer support tree densities that they did historically.

Historically, western (*Dendroctonus brevicomis*) has caused the most damage in the California pine regions, but this insect has caused loss of ponderosa pine over the years in Oregon and Washington including the Blue Mountains (Gast et al. 1991). Western pine beetles typically breed in trees that are fire-damaged, drought stressed, or attacked by other agents such as mountain pine beetles or root disease. Large ponderosa pines are particularly susceptible where crowns are declining due to overly dense stands. They are at high populations currently due to recent drought. Managing stand density under the guidelines for mountain pine beetles will also reduce the risk from western pine beetles (Spiegel and McWilliams 2014). Where individual large, old pines are to be retained, Kolb et al. (2007) recommend thinning around these trees to increase resources to them.

Douglas-fir dwarf mistletoe - Douglas-fir dwarf mistletoe (*Arceuthobium douglasii* Engelman) is a very common pathogen in the Blue Mountains and as such it is probably the greatest threat to long term successful management of Douglas-fir in the area. Forest Inventory data on the Wallowa Whitman NF indicates that 57 percent of the type is infected (Marsden et al.). Stands in the Douglas-fir plant

community series with dominant components of susceptible hosts from early through late successional stages often have very high levels of infestation, with severe infection levels on individual trees. Stands in communities where Douglas-fir is a minor component or only became established late in succession, usually have incidental or scattered light dwarf mistletoe infections (Schmitt 1997). Based on inventory data, these trends hold true within the LJCRP project area.

**Root diseases** - Root diseases included in this group include laminated root rot (*Phellinus weirii*) and Armillaria root disease (*Armillaria ostoyae*).

Laminated root rot is caused by the fungus, *Phellinus weirii*. This root disease causes severe damage in affected mixed conifer stands. Most of the disease's impact results in direct tree mortality and growth loss. Douglas-fir and grand fir are highly susceptible; western larch, subalpine fir and Engelmann spruce have an intermediate susceptibility and pine is tolerant (Gast et al. 1991).

Armillaria root disease is caused by the fungus, *Armillaria ostoyae*. This is one of the most common and damaging root diseases in the Blue Mountains. In active disease centers, trees are often killed outright or are frequently weakened and attacked by secondary pests. Site damage (i.e. soil compaction) and stresses to hosts generally increase the mortality caused by this pathogen (Spiegel and McWilliams 2014). All conifer species can be infected, but grand fir is among the most susceptible hosts while western larch and lodgepole pine are usually least affected (Gast et al. 1991). The highest incidence has been observed in moister plant communities. Armillaria root disease was confirmed within the project area killing Douglas-fir, grand fir, and small ponderosa pine (Spiegel and McWilliams 2014).

Table 34 lists the areas acres of insect and disease activity within the LJCRP area from 2008 – 2013 as observed through annual aerial surveys

**Table 34. LJCRP forested acres affected by specific insects from 2008 to 2013.**

Insect	Acres Affected					
	2008	2009	2010	2011	2012	2013
Douglas-fir Beetle	115	3,067	141	30	46	232
Fir Engraver	23	237	848	20	56	47
Mountain Pine Beetle – Ponderosa Pine	16	268	27	26	24	32
Mountain Pine Beetle – Lodgepole Pine	0	49	493	81	102	56
Western Pine Beetle	11	89	11	8	115	16

### *Insect and Disease Susceptibility*

Susceptibility is defined as a set of conditions that make a forest stand vulnerable to substantial injury from insects or diseases. Susceptibility assessments do not predict when insects or diseases might reach damaging levels; rather, they indicate whether stand conditions are conducive to declining forest health, as indicated by increasing levels of tree mortality from insect and disease organisms.

Drought, ecological site potential (potential vegetation type), species composition and abundance, tree size, forest structure (canopy layering, structural stage), stocking (tree density), intra-stand variability (clumpiness), and other biophysical factors influence susceptibility and vulnerability to insect and disease disturbances (Hessburg et al. 1999, Lehmkuhl et al. 1994, Schmitt and Powell 2005).

Trees with increased insect or disease susceptibility often occur in dense forests where they face greater competition for soil moisture, nutrients, and other resources. For example, ponderosa pines in high-

density stands have lower xylem water potentials and rates of photosynthesis, indicating greater drought stress (in this instance, high density causes physiological drought rather than climatic drought). These trees also have decreased resin production and foliar toughness, suggesting an increased susceptibility to insect and pathogen attack (Kolb et al. 1998).

To provide a process for evaluating insect and disease susceptibility, range of variation information was developed for nine insect and disease agents, and three classes of susceptibility (high, moderate, low), and it is stratified by potential vegetation group (Powell 2010).

Table 35 lists the susceptibility ratings for the six insect and disease agents associated with the PVGs and cover types within the LJCRP area. Current ratings for the dry upland forest PVG indicate conditions in the low rating are above the range of variation (RV) for bark beetles in ponderosa pine; are below RV for defoliators, Douglas-fir beetle, fir engraver and Douglas-fir mistletoe; are within RV for root diseases. For the high rating, defoliators, Douglas-fir beetle, fir engraver and Douglas-fir mistletoe are above RV; bark beetles in ponderosa pine are below RV; root disease is within RV. For the low rating in the moist PVG, Douglas-fir beetle, fir engraver, bark beetles in ponderosa pine and Douglas-fir dwarf mistletoe are below RV; defoliators and root diseases are within RV. The high rating in the moist PVG indicates Douglas-fir beetle, fir engraver and Douglas-fir dwarf mistletoe are above RV; defoliators, bark beetles in ponderosa pine and root diseases are within RV.

**Table 35. Insect and disease susceptibility in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Agent	Susceptibility Rating - % of Forested Area					
		Low		Moderate		High	
		Existing	RV Range	Existing	RV Range	Existing	RV Range
Dry upland forest (UF)	Defoliators	25%↓	40-85%	35%↑	15-30%	39%↑	5-15%
	Douglas-fir Beetle	15%↓	35-75%	39%↑	15-30%	45%↑	10-25%
	Fir Engraver	41%↓	45-90%	45%↑	10-25%	14%↑	5-10%
	Bark Beetles in P Pine	23%↑	5-10%	56%↑	15-30%	21%↓	40-90%
	Douglas-fir Dwarf Mistletoe	14%↓	25-55%	39%	15-40%	47%↑	20-35%
	Root Diseases	31%	30-60%	47%	25-50%	22%	5-25%
Moist upland forest (UF)	Defoliators	8%	5-10%	29%	20-30%	63%	35-90%
	Douglas-fir Beetle	5%↓	30-60%	23%	20-40%	71%↑	10-30%
	Fir Engraver	19%↓	30-70%	34%	20-35%	47%↑	10-20%
	Bark Beetles in P Pine	32%↓	40-70%	52%↑	15-35%	16%	5-25%
	Douglas-fir Dwarf Mistletoe	11%↓	30-65%	33%	20-45%	56%↑	10-20%
	Root Diseases	14%	5-15%	49%	20-50%	36%	35-75%

↓ less than RV; ↑ greater than RV

Characteristic levels of insect and disease activity consistent with the range of variability would contribute to diverse landscape conditions and provide important wildlife habitat components such as hollow trees, dead wood, and mistletoe brooms as well as opportunities for stand initiation and development through gap dynamics. The desired conditions for vegetation structure stand density, and

species composition would create stand conditions with low to moderate susceptibility to insects and diseases across the majority of the upland forest PVGs within the Lower Joseph project area. These stand conditions result in an adaptable and resilient forest condition capable of absorbing disturbances while retaining the same basic structure and ways of functioning, the capacity of self-organization, and the capacity to adapt to stress and change.

### *Rangelands*

Domestic livestock grazing began in the 1730s, when horses were kept by the Nez Perce. Cattle were also grazed by the Nez Perce beginning in the 1830s. Nez Perce livestock numbers (horses and cattle) peaked between 1876 and 1877 at about 23,000 animals (Williams 2009). The Blue Mountain forests furnished grazing for domestic livestock since the days of the first settlers in the 1870s. For example, prior to the establishment of the Wenaha Forest Reserve (now part of the Umatilla NF) there were somewhat in excess of 275,000 head of grown sheep plus their increase, 40,000 head of cattle, and 15,000 head of horses grazed annually on the Wenaha Reserve alone. This extremely heavy use “is no doubt responsible for the present condition of the range” (Ewing, Umatilla NF Forest Supervisor 1939). “Under Forest Service administration numbers of stock permitted were rapidly decreased until now approximately 88,102 head of sheep and 8,528 head of cattle and horses are grazed on the entire Umatilla Forest, which is nearly twice the size of the original Wenaha Forest Reserve” (Ewing 1939). In the Wallowas, as in many parts of the West, excessive grazing by domestic sheep and cattle had damaged or were damaging the ranges almost beyond repair. Soil erosion was extensive, and the desirable forage plants were greatly reduced or, in some areas, eliminated. Parts of the range had become “practically valueless for grazing purposes” (Sampson 1908, in(Strickler 1980)). From 1907 to 1911, Arthur Sampson, a USFS plant ecologist, studied the effects of sheep grazing in the Wallowa Mountains. Sampson’s work resulted in the reduction in livestock numbers on the range as well as various land and livestock management practices, including deferred grazing and non-use, initiated to promote recovery of the range (Strickler 1980). Domestic livestock numbers were decreased greatly between 1906 and 1980. Sheep numbers decreased from around 250,000 on the Wallowa NF in 1906 to around 15,000 in 1980 (Williams 2009). Cattle numbers at the beginning of the twentieth century were around 19,000 in Wallowa County. Cattle numbers peaked in Wallowa County in the 1950’s at just over 50, 000. As of 2004 cattle in Wallowa County numbered under 30,000.

Elk and deer (mule and white tail) are the primary native ungulates. By the beginning of the 20<sup>th</sup> century elk and white tailed deer had been virtually eliminated from the Blue Mountains through over hunting by European emigrants. Hunting limits on wild ungulates were initiated, and numbers quickly increased, partly due to a decrease in predators, which were also being hunted by settlers (Cliff 1939). Currently, elk populations are relatively stable, although not at historic levels, with decreased survival of calves, possibly due to a decrease in August precipitation through the last half of the 20<sup>th</sup> century. Deer populations continue a long decline from historic levels (Cliff 1939, Johnson 2012, Johnson 2014 correspondence). Livestock, elk, and deer have some overlap in forage use, but distribution of use is different for each species, based on differences in foraging behavior (Johnson 2014 pers. comm.).

The LJCRP area is part of the Joseph Creek Rangeland Planning Area and encompasses portions of eighteen livestock grazing allotments (Map 17; Table 36). Fourteen are managed under the Wallowa-Whitman forest plan, and four are managed under the HCNRA CMP. Only the active allotments will be covered in more detail within this DEIS.

Goals for rangeland management on the WWNF include managing range vegetation and related resources in a manner insuring that the basic needs of the forage, browse plants, and soil resources are met, and to make available for harvest forage production that is in excess to the basic needs of the plants and soil resource, for wildlife and domestic livestock (within Forest Plan standards). See Appendix B for forest plan direction applicable to rangeland management. Restoration of forage will be analyzed in this document. Changes in allotment management are beyond the scope of this analysis.

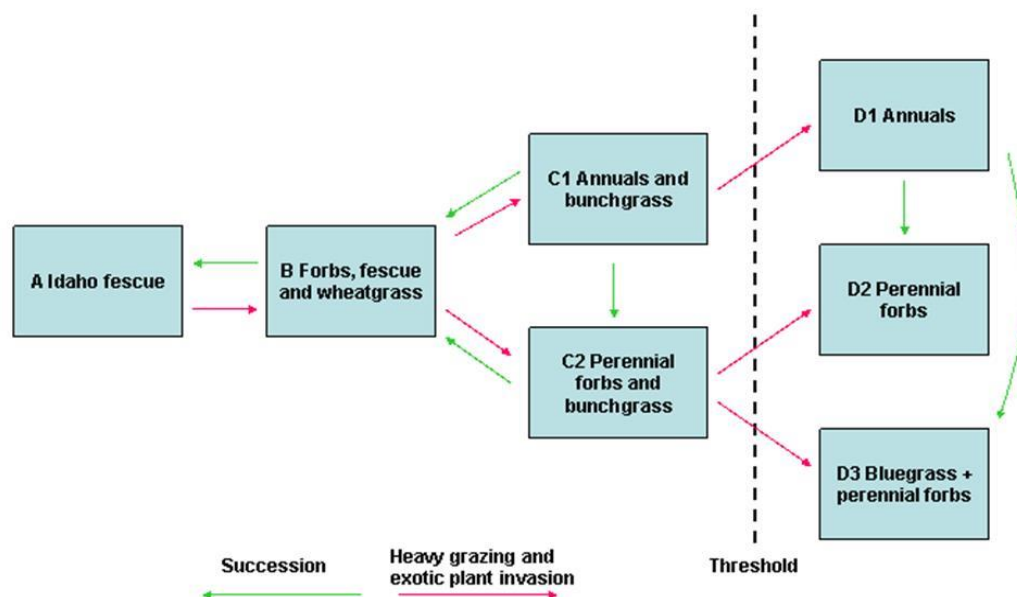
**Table 36. Summary of Total Acres by potential vegetation group and grazing allotment**

Allotments	Dry UF	Dry UH	Dry US	Meadows	Moist UF	Moist UH	non veg	Total
AL-CUNNINGHAM	434	842			3	11		1291
BUCK CREEK	152	9			66	10		237
CACHE CREEK*	302	1251	20		5	43		1621
CHESNIMNUS	53	8			43	15		119
COLD SPRINGS*	9866	8671	181		2432	462		21612
COUGAR CREEK	5855	2878	35		1202	775	32	10778
CROW CREEK	96	1				72		168
DAVIS CREEK	3198	896		131	577	191		4993
DOE CREEK	644	212			390	66		1311
FINE	165	0				317		483
HUNTING CAMP	4877	2062			2485	806		10230
JIM CREEK*	42	74						116
JOSEPH CREEK	400	468	89			24		981
LOST COW*		150	0					150
MUD CREEK	0	1			0	3		4
SWAMP CREEK	12283	9985	38	230	264	351	15	23165
TABLE MOUNTAIN	5174	6410	635		1467	912		14598
TEEPEE ELK	2453	2066	9		626	137		5291
Total	45994	35986	1007	360	9562	4165	47	97150

\* Allotment administered under HCNRA

Overall quality of habitat on a landscape scale using percent departure from historic range of variability (HRV) by Potential Vegetation Groups (PVG) is given for coniferous forest (see section on Vegetation and Disturbance). HRV for grasslands is described using the state and transition concept (See Figure 6 for an example for the Idaho fescue-prairie junegrass (Ridge) plant association). According to the state and transition model, vegetation at a given site is determined by a complex set of interactions of past management, natural disturbances, climate, and seed sources and are described as a phase A through D where:

- **A** - Vegetation is relatively pristine, close to the potential natural vegetation
- **B** - Vegetation has been moderately altered by grazing to the point that grazing sensitive species (decreasers) are diminished but still present
- **C** - Vegetation has been greatly altered by grazing but still retains enough native species to be able to recover to PNV
- **D** - Vegetation has been altered by loss of native species and invasion of non-native species. This phase has crossed a transition to a new state, meaning return to PNV by natural succession is probably not possible (Johnson 2005)



**Figure 6. Example of a State and Transition Model: Idaho fescue-Prairie Junegrass (Ridge) Plant Association and degenerated bench plant community type (Ecology Intranet Site version 2008).**

In an evaluation of Blue Mountain ecology plot data, sixty-seven percent of the sampled plots in the moist upland herbland potential vegetation group within the LJCRP were in good to fair condition (Phases A and B). In the dry upland herbland potential vegetation group, eight percent of the sampled plots within the project area were in good or fair condition. Condition is evaluated on vegetation composition, such as cover of non-native annual grasses in relation to perennial bunchgrass cover, and the location of large areas of bare soil in relation to plant cover, biological soil crust, and litter. Under the current grazing system, big-game winter range has been adequate, according to ODFW wildlife biologists. Isolated unsatisfactory range conditions were found within the Joseph Creek Wild and Scenic River corridor (MA 7). These unsatisfactory conditions are evident where annual non-native plant species such as cheat grass and other introduced grass species exist as a relic of homesteading prior to establishment of the National Forest. Range conditions in the proposed RNAs are in a good ecological condition because their steep slopes and lack of available water preclude the primary source of threat (livestock grazing). These areas are represented by phase A and B plant communities. For pastures within designated old growth (MA 15), particularly in moist forest, the existing range production potential is relatively low since the conifer overstory generally precludes sustainable rangeland.

Forage resources on these allotments are dominated by rangeland plant associations that include lithosols, and bunchgrass grasslands including both the Idaho fescue series, and bluebunch wheatgrass series. Dominant open-forested plant associations where livestock use occurs are dry forest ponderosa pine series and Douglas-fir series (Johnson 1987, Johnson and Simon 1987). Much of the LJCRP area occurs in the warm/dry grand fir plant association groups. The project area also includes non-native perennial and annual grasses and forbs from past management activities, especially in open-forested areas.

Fire suppression practices in dry upland forests have indirectly allowed shade tolerant tree species to gradually increase in density and size, exhibiting competitive dominance over herbaceous forage species in LJCRP area. While fire has historically played an important role in all vegetation types, moist upland forests have shrub dominated understories, sometimes with pinegrass as a co-dominant in the understory (Powell et al. 2007) While livestock can use shrubs and pinegrass for forage, neither are preferred forage during typical summer and fall grazing seasons (FEIS website).

### Forage production

Information including existing vegetation, potential vegetation, and soils was used to make the capability and suitability identification. Capability depends upon current resource conditions and site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices, such as silvicultural treatments or protection from fire, insects, and disease. Once the capable rangeland is determined, acres that do not have a proposed management area prescription that would allow for grazing are subtracted. Administrative sites, recreation areas, and other areas of specific use are also subtracted, as are areas specifically closed to grazing by past actions or incompatibility of use between resources. Total land base acres (minus unsuitable and noncapable) give the modeled suitability determination. This is a landscape scale estimation based on GIS modeling and is not a site-specific determination.

Annual forage production has not been used as a measure on the Wallowa Valley Ranger District for many years, so there is no current data on actual forage production. Table 37 displays forage production that can be expected by Potential Vegetation Group (2014 Forest Plan Revision adapted from Johnson and Simon 1982, Johnson and Clausnitzer 1990).

**Table 37. Expected forage production by potential vegetation group (USDA Forest Service 2014)**

Vegetation Group	Representative plant association code and name	Forage production (pounds per acre per year)	Allotment Acres within LJCRP
Dry Upland Forest (Dry UF)	CWG112, Grand fir pine grass	300 - 600 (450)	45,994
Dry Upland Herbland (Dry UH)	GB41, Bluebunch wheatgrass	400 - 800 (600)	35,986
Dry Upland Shrubland (Dry US)	SD9111, Stiff sagebrush / Sandberg's bluegrass	100 - 250 (200)	1,007
Meadows	MD3111, Kentucky bluegrass (dry meadow)	200 - 600 (400)	360
Moist Upland Forest (Moist UF)	CWF311, Grand fir / Twinflower	<200	9,562
Moist Upland Herbland (Moist UH)	GB5917, Idaho fescue-bluebunch wheatgrass-balsamroot	200 - 1,730 (965)	4,165

### Rare plant species

#### Threatened, Endangered and Sensitive Plants

There are two federally listed threatened plant species with potential habitat in the LJCRP (USFWS 2014). McFarlane's four o'clock (*Mirabilis macfarlanei*) is not suspected in the LJCRP as a result of previous work in the project area. While suitable habitat for Spalding's catchfly (*Silene spaldingii*) exists in the project area, no occupied sites were found within LJCRP.

TES plant surveys were conducted in the Lower Joseph Watershed as part of the 2010 Lower Joseph Range EA (JCRAA). Over 3000 acres of potential habitat within the JCRAA were inventoried (under contracts) for potential sensitive and listed plant species during the 2003 & 2004 field seasons (USDA Forest Service R6 Regional Forester's Sensitive Species List). These surveys targeted areas modeled as very high and high potential habitat for (MacFarlane's four o'clock in Joseph Canyon) and Spalding's

catchfly, as well as potential habitat for Forest Service Sensitive plant species (Murray 2001). Follow-up visits to many sensitive plant occurrences resulted in the identification of new individuals and occurrences and more accurate counts of individuals at known sites. In 2014, using existing information and local expertise, an additional 23,747 were surveyed, focusing on *Silene spaldingii* habitat as well as other suspected TES plant species. New populations of *Achnatherum wallwaensis* and *Erigeron englemannii* v. *davisii* were found, but no *Silene spaldingii* was located.

LJCRP is not within a key conservation area for Spalding's catchfly (Service 2007). Key conservation areas were designated in the Recovery Plan for *Silene spaldingii* (USFWS 2007) and are areas with intact habitat able to support at least 500 individuals. The Key Areas closest to LJCRP are Joseph Creek on Nez Perce Precious Lands Wildlife Management Area within the Canyon Grasslands biophysical province, and Crow Creek, primarily on the Wallowa-Whitman NF, within the Blue Mountain Basins biophysical province. As a result of the absence of occupied habitat, in combination with project design criteria to protect grassland habitat, LJCRP is not likely to adversely affect Spalding's catchfly. A separate Biological Assessment will be prepared for Spaulding's catchfly and submitted to USFWS. Habitat analysis for Spalding's catchfly is included with the R6 Sensitive species found in grasslands since there is potential habitat for this species. Appendix E lists all suspected and documented TES plant species. Appendix F provides more information on sensitive plant species habitat types.

Sources of information regarding TES plants in LJCRP include:

- NRM TES Plant tabular and spatial data USFS 2014
- Lower Joseph Range Analysis, WMO, 2005
- Lower Joseph Watershed Analysis (Wallowa-Whitman National Forest 2010, Wallowa County 2014)
- Recovery Plan for *Silene spaldingii* (Spalding's catchfly), USFWS 2007
- Project Files for The Blue Mountain LRMP, Brooks 2007
- USDA NRCS Plants Database (website)
- 2007-2013 Consortium of Pacific Northwest Herbaria (website)
- Interagency Special Status / Sensitive Species Program (website)
- Oregon Biodiversity Information Center

### *U.S. Forest Service Region 6 Sensitive and Strategic Plants*

Appendices E lists sensitive plant species that are suspected or known to occur in the LJCRP. These species are described below by habitat group. Appendix F also provides more information on these species' habitats.

#### **Coniferous Forest (Dry upland forest and moist upland forest PVGs)**

The conifer forest habitat group includes all types of forest found in LJCRP, from dry ponderosa pine forest to the moist grand-fir, although most of the TES species listed below are found in mesic/moist conifer habitat. Cordilleran sedge (*Carex cordillariana*) and clustered lady's slipper (*Cypripedium fasciculatum*) are found in both moist and dry forests, though both plants need some shade, if not tree canopy, then shrub canopy. Northern twayblade (*Listera borealis*) is found in forested areas with high soil moisture such as mossy areas, forested swampy areas and along forested cold streams. Both the clustered lady's slipper and northern twayblade are in the orchid family and require some sort of mycorrhizal symbiont. Mycorrhizae are the underground portion of a group of mushrooms that grow on the roots of plants, taking nutrients from the host plant or tree in return for more efficient nutrient and water absorption by the plant or tree host. The truffles, *Rhizopogon subclavatisporus* and *R. bascillisporus* have scant habitat information and are assumed to be found in both dry and moist conifer forests. Truffles are

mycorrhizal fungi whose fruiting bodies stay below the soil surface. Coarse woody debris is an important substrate for liverworts and mosses in forest habitats. Bug on a stick is found on a variety of substrates such as wood or soil in both open and closed canopy forests, though associated tree species (Douglas-fir, western hemlock, and lodgepole pine) suggest moist to cold forests. Moist forests are the habitat of nagehyde liverwort (*Ptilidium pulcherrimum*), in LJCRP it would be expected in the most mesic forested habitats, likely on the lower boles and bases of trees. Goblin's gold (*Schistostega pennata*) and bent stem moss (*Tetraphis geniculata*) both inhabit closed canopy, low light areas on wood or soil. Pacific Yew, (*Taxus brevifolia*) is not a sensitive species, but is a species of concern for the WWNF Wallowa Mountain District. Pacific Yew, like many of the suspected sensitive plants and bryophytes, requires closed canopy conditions in the most mesic of moist forest habitat found in LJCRP.

Potential threats to TES plants in coniferous forest habitat are: changes in light regimes; changes in soil moisture and microsite humidity due to loss of canopy closure; grazing; prescribed burning in the spring; soil disturbance from logging activities; and road construction and maintenance. For clustered lady's slipper, fires severe enough to burn through the duff layer and into the organic horizons may damage the shallow rhizome/root system. Lichthardt (2001) studied fire effects on *C. fasciculatum* on the Wenatchee NF and their work suggests that the species cannot tolerate high-intensity fire that eliminates the duff layer, as indicated by a lack of roots and rhizomes found in excavations after fire. Opening canopy for cordilleran sedge, through mechanical treatment or fire may provide habitat, but may also make plants more susceptible to grazing. Appendix F provides more information on sensitive species suspected to occur in coniferous forests in the LJCRP area.

### **Grasslands (Moist and Dry Upland Herbland PVGs)**

Grasslands are composed of upland herbaceous vegetation dominated by grasses. Grasslands include both moist and dry bunchgrass habitats. Meadows and grass or grass-like dominated riparian areas are separate habitat groups. There are two grassland species documented in the LJCRP, green band mariposa lily (*Calochortus macrocarpus* v. *maculosus*) and rough rabbitweed (*Pyrrocoma scaberula*). Both are regional endemics, meaning they are only found in our part of the world. There are thirteen records (Oregon Biodiversity Information Center) of rough rabbitweed in the Joseph Canyon area, only one is in the project area, the other twelve are adjacent, with eleven on Nez Perce precious lands and one on BLM land. Rough rabbitweed is a composite (in the daisy/ sunflower family) that grows in deeper grassland soils with Idaho-fescue, often in transition zones between grassland and Douglas-fir-ponderosa pine stringers. It is remarkable that there is only one known population on USFS lands in the LJCRP project area. Nez Perce Precious Lands to the north are not grazed. It is unknown at this time what factors influence the presence or absence of rough rabbitweed. Green band mariposa lily is a member of the lily family, and like many lilies has a corm or strachy bulb that helps this plant survive in the more xeric rockier parts of the Joseph canyonlands. Green band mariposa lily is slightly more plentiful with ten populations within the LJCRP and another six populations on other land ownerships. This species is a seasonal round plant for the Nez Perce tribe. Both green band mariposa and rough rabbitweed are concentrated at the very north end of the LJCRP, extending north into other land ownerships. The known site of *Pyrrocoma scaberula* is not near any project activities. Moist upland grasslands, those in the Idaho fescue plant associations, are also habitat for Spalding's catchfly. Rough rabbitweed sites were found during searches for the rare, endangered catchfly (Roger Ferriell, pers. comm.). Spalding's catchfly is also found at the bases of toeslopes in Idaho fescue grasslands (S. Geer, pers. comm.), which can be drier sites and the rough rabbitweed sites. The suspected plant, needle leaf sedge is a small inconspicuous grasslike plant that grows in dry prairie, sagebrush steppe and open forest. In our area it is a glacial relict, where small isolated populations were left after the last glacier retreat. Current documented populations are in the northern Rockies. There is one historic site from Baker county dated 1938. *Delphinium bicolor* is suspected in the project area and is found in dry meadow edges, sage scrub, open woodlands and woodland edges, and in seepy areas in dry forest.

For the most part, moist upland herbland is in good to fair condition within the project area. Dry upland herblands are generally in fair to poor condition in the project area. The generally poor condition of dry upland herblands may be due to drier soil conditions and shorter growing seasons in droughty years which may make recovery slower than recovery of moist upland herblands, even when management is changed in a positive direction. Moist grasslands and dry grasslands are both at risk from degradation due to grazing, which can include increases in size and connectivity of bare soil patches, loss of biological soil crusts, and increases in invasive non-native annual grasses and noxious weeds. Care must be taken regarding timing and extent of prescribed fire in grasslands. Spring burning, if conditions allow it, can damage growing plants. Prescribed burning must be done in coordination with grazing so that grasslands have time to recover from burning prior to grazing. Idaho fescue is often suppressed for a few years after wildfire, after which it regains its former cover, while other species in Idaho fescue communities return to prefire cover in the first year after fire. Bluebunch wheatgrass plant associations typically regain prefire cover in the first year after fire. Other threats to grasslands are ground disturbance from road construction and maintenance, and logging. Appendix F provides more information on sensitive grassland species suspected or known to occur in the LJCRP area.

### **Moist meadows**

Moist meadows are typically saturated in the spring, but by mid to late summer the water table has fallen below the soil surface. In LJCRP there are many moist meadows interspersed within forested areas. Several sensitive plant species are found in the transition zone between the wet or moist meadows and the surrounding forest or otherwise drier areas, such as moonworts (*Botrychium spp.*), dwarf Phacelia (*Phacelia minutissima*), and Douglas' clover (*Trifolium douglasii*). Camas and yampa are two important food plants that occur in these habitats. Main threats are road or trail construction or maintenance, recreationists, off highway vehicles, forage seeding, poorly designed or broken water developments, changes in the water table, possibly logging and burning projects, and grazing. Appendix F provides more information on sensitive meadow species suspected to occur in the LJCRP area.

### **Springs and seeps**

Springs are points where groundwater emerges and flows. Groundwater also feeds seeps, but seeps do not produce perennial flow. Threats include grazing, improperly placed or malfunctioning water improvements, and other activities that cause changes in hydrology. Springs and seeps are typically small, but are well distributed on all three forests in the plan area. Appendix F provides more information on sensitive species suspected to occur in springs and seeps in the LJCRP area.

### **Wet meadows, riparian**

Wet meadows are saturated throughout the growing season with the water table at or slightly below the soil surface. Threats include changes in hydrology, trampling and browsing, invasive wetland plants, such as reed canary grass. Appendix F provides more information on sensitive species suspected to occur in wet meadows and riparian areas in the LJCRP area.

### **Rock Outcrops, Talus, Scree**

Talus, cliffs, and rock outcrops are expected to be impacted to a relatively small degree. Outside wilderness areas, this habitat type is likely to be the least affected by forest and rangeland management activities. This is because talus, cliffs, and rock outcrops support scant vegetation that does not support or attract grazing livestock or possess sufficient fuel to carry a prescribed fire. Road construction and rock quarries are apt to be the only management activities with potential to affect these sites. Appendix F provides more information on sensitive species suspected to occur on rock outcrops, talus or scree habitats in the LJCRP area.

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## **Lithosols and Rigid Sagebrush Steppe**

Lithosols are habitats with very shallow soils with little zonation on poorly weathered basalt or andesitic bedrock. While the soils can be saturated following spring snow melt, they dry quickly and are exposed to full sun for the entire growing season. Plants adapted to this harsh environment usually bloom and fruit early in the growing season. Basalt lithosols can be found in the dry upland shrubland potential vegetation group or dry upland herbland potential vegetation group. Basalt lithosols may also be found as small inclusions within a larger matrix of grassland and shrublands, as well as adjacent to forests. The common plant associations within the dry upland shrubland and dry upland herbland potential vegetation groupings are stiff sagebrush or low sagebrush/Sandberg's bluegrass, bluebunch wheatgrass/Sandberg's bluegrass or Sandberg's bluegrass/one-spoke oatgrass. Countryman, et al (2012) found that conditions had improved in the dry shrubland potential vegetation group from 30 years earlier, but that this improvement has slowed. The dry herbland potential vegetation group has experienced invasion by nonnative plants resulting in conversion of some lands to exotic herblands (Hann 1997). Wallowa ricegrass, Englemann's daisy, and white cushion Erigeron are documented on lithosols in the LJCRP project area. The lichen, *Thelotrema muscorum* v. *octospora*, a component of biological soil crusts, is suspected. Appendix F provides more information on sensitive species suspected or known to occur on lithosols in the LJCRP area. Threats to lithosol habitat include: livestock trampling, grazing and trailing especially before soils have dried sufficiently; salt blocks, invasion of exotics, road construction, OHV traffic, and log decking.

### *Diversity and viability of plant habitats*

#### **Diversity**

"Forest planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process. Inventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition. For each planning alternative, the interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices." (36 CFR 219.26)

Diversity is given in this document as total number of vascular plant species, as a ratio of native to non-native plants, and as values using the Shannon diversity index, which gives an idea of the variance within Potential Vegetation Groups found in the LJCRP. The Shannon diversity index represents information for a community, where the more variation in a community's composition, the less predictable each sample of it would be. Values range from 0 for a community with one species to values up to 7 for communities with many species. The higher the number, the less predictable the sample (Barbour 1987).

Plants were categorized according to information from NRCS Plants database and the Blue Mountain Ecology database. Ecology plots established to describe plant communities and associations provided species lists for each habitat type. Ecology plots were established to be representative of vegetation types in good condition, and while the data from ecology plots cannot be directly extrapolated to the project area, they provide useful information on the potential vegetation types they represent.

#### **Viability**

"For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." (36 CFR 219.19) Species included on the R6 Regional Forester's TES list have viability concerns. In addition to the R6 determination of viability at risk, Oregon Biodiversity Information Center (ORBIC), a state funded entity that provides information on Rare Plants and Animals in Oregon, provides more detail about the type of rarity/viability

risk for each species. ORBIC uses a 1-5 scaled ranking, based primarily on the number of known occurrences, but also including threats, sensitivity, area occupied, and other biological factors. Global (G) and State (S) are included. The ranks are summarized below:

1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences.

2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences.

3 = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences.

4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences.

5 = Demonstrably widespread, abundant, and secure.

H = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered.

ORBIC rankings and range information from literature and herbarium information are included for each documented or suspected species in the project area.

### Habitat

Overall quality of habitat on a landscape scale using percent departure from historic range of variability (HRV) by Potential Vegetation Groups (PVG) is given for coniferous forest. HRV for grasslands is described the state and transition concept. According to the state and transition model, vegetation at a given site is determined by a complex set of interactions of past management, natural disturbances, climate, and seed sources (See Range section for explanation).

Table 37 shows diversity as a function of native to non-native plants and gives the Shannon diversity index value, which is a reflection of variability where a higher score indicates greater variability for that community. Percent native cover in the LJCRP is greater than for the Blue Mountains in general. Reasons for this could be more productive site conditions, or less historical disturbance than the overall conditions found in the Blue Mountain ecoregion.

**Table 38. Native plant diversity for the LJCRP area**

Habitat	Total Species Richness	Native Species Richness	Percent Relative Cover in Native Species	Shannon Diversity Index
ARRI/POSA3 (SCAB)	60	53	93	3.7
Cold Moist FEID	140	116	89	4.4
Dry UH	126	109	91	4.4
Moist UF	80	73	95	3.9
Dry UF	139	110	86	4.3

### *Non-native invasive plants*

Non-native invasive plants (weeds) threaten economic and ecologic viability in the Lower Joseph Creek Watershed. Across the watershed, weeds threaten ecological integrity by reducing biodiversity, altering

native plant communities, altering stream nutrient release cycles, and increasing soil erosion. Weeds are damaging to rangeland health because they simplify riparian and upland plant community structure and function, and reduce forage quality and quantity (Wallowa County 2006b). These impacts degrade economic and social values of agricultural lands, rangeland, forestlands, and wetlands. Annual economic losses from 21 of the 99 noxious weeds listed by Oregon, estimated in 2000, were \$83 million dollars, or about 3,329 jobs per year (ODA Plant Division 2001). Noxious weeds can spread at an estimated rate of 8 to 14% per year (Whitson 1998), and for some species, at rates of 60% growth per year (Prather 1989). Appendix H summarizes most of the non-native invasive plants found within the project area.

Non-native annual grasses alter grasslands by competing with native plants for limited resources and increasing fine fuels. They can form heavy thatch which may interfere with biological soil crust (BSC) development and alter BSC species composition and the growth of native seedlings. Non-native annual grasses known to occur in the LJCRP area are *Bromus japonicus*, *Bromus brizaeformis*, *Bromus mollis*, *Bromus tectorum*, *Ventenata dubia*, *Taeniatherum catput-medusae*, and *Vulpia myuros*. The extent of infestation by non-native annual grasses can only be speculated, since records are incomplete for these species. It is assumed that all grasslands within the project area have the potential to be infested.

Some non-native pasture grasses were planted in the past, notably after the 1986 Wildcat fire. Like non-native annual grasses, these species also compete with native species for available resources. Current non-native pasture grass species are: *Dactylis glomerata*, *Thinopyrum intermedium*, *Phleum praetense*, and *Bromus carinatus x cultivar*. These cultivars, which have persisted and thrived since planting, now occupy roadsides, openings and disturbed and undisturbed open areas throughout the project area. The persistence of these species are now known to be problematic when used for restoration purposes (USDA Forest Service Region 1 2014). Inventory and the history of planting pasture grass are incomplete. Multiple introductions may have occurred before or after the 1986 post-fire seeding. Information regarding the 1986 post-fire seeding was lost in the 2009 fire that burned the Wallowa Mountains Visitor Center and federal office building.

Construction and use of roads contributes to the expansion of undesirable exotic plants and noxious weed populations throughout much of the forest. Roads are the primary spread corridors for weedy species as vehicles readily transport seeds on their undersides and muddy tires. Large populations of noxious weeds and exotic plants are found along roads that access forest land from agricultural areas. Smaller populations are found throughout the project area, with the highest concentrations found along heavily traveled roads. Weedy species are detrimental to native plant communities, displacing natives and potentially converting entire communities to exotic groundcover. Adverse effects include a loss of species diversity in understory plant communities, degradation of wildlife habitat and range forage, and loss of soil-holding capacity leading to increased erosion and sedimentation. Grasslands and grass-tree mosaic communities are most at risk from expanding weed populations. Several of these already contain rapidly expanding populations of yellow starthistle, knapweed, ventenata grass, and medusahead.

Besides providing transport routes, roads provide prime seedbeds for weedy species. New road construction and regular maintenance activities create the bare soil and early seral conditions that offer advantage to these aggressively invasive plants. Roads also offer an advantage of easy access for monitoring and treatment of noxious weed populations that are already established. Closing roads that currently support noxious weed populations can impede treatment access.

During reconnaissance of the project area, it was found that not all noxious weed sites have been recorded in the Forest Service's corporate database (Natural Resource Manager (NRM)). *Cynoglossum officinale* (hound's tongue) is common along roads within the project area, as well as old landings, but has not been documented thoroughly. It was assumed for this analysis that hound's tongue is present throughout the road system and has the potential to be on all old landings.

Non-native annual grasses and seeded forage grasses are not currently documented in the NRM database. The Forest Service's Blue Mountain Ecology program maintains a database with data collected from ecology plots and range condition and trend plots in key areas. Range monitoring key areas and ecology plots are subjectively selected to represent typical vegetation and condition; hence, the data cannot be directly extrapolated to the project area. In addition, ecology plots are not placed in highly disturbed areas such as landings, salting areas, water troughs, roadsides, quarries, or old agricultural fields where non-native invasive species are most prevalent. However, the amount of cover in noxious weeds, non-native annual grasses, and seeded forage grasses documented on range and ecology plots likely represents what is typically found in the project area in general.

Appendix H lists invasive plant species documented in the NRM database, and/or observed in the LJCRP area. The NRM database focuses on state listed noxious weeds, but can include any invasive plant of concern. NRM database also tracks invasive plant surveys as well as treatments.

## Treatment History

In an effort to effectively and strategically manage noxious weeds across the landscape, the Wallowa Canyonlands Partnership (WCP) began in 2000. The WCP is a Cooperative Weed Management Area (CWMA) that works with federal, state, and county agencies, private landowners and the Nez Perce tribe to manage noxious weeds across jurisdictional boundaries. In the past, the WCP steering committee included the Wallowa-Whitman National Forest, Wallowa Resources, Tri County CWMA, Oregon Dept. of Agriculture, Wallowa County Vegetative Dept., The Nature Conservancy, and BLM. As they began work in Lower Joseph Creek, the WCP worked with Asotin County and Washington Dept. of Fish and Wildlife.

In March 2010, the Final EIS for the Wallowa-Whitman National Forest Invasive Plants Treatment was completed. A Record of Decision was signed on April 2, 2010. The project was underway when the Forest Service was sued by the League of Wilderness Defenders (District of Oregon, in *League of Wilderness Defenders/Blue Mountains Biodiversity Project v. United States Forest Service and Connaughton*; Case 3:10-cv-01397-SI). The court found the purpose and need for action, Proposed Action, range of alternatives, and direct/indirect effects analysis adequate to meet the spirit and letter of NEPA. However, the court found the original cumulative effects analysis inadequate (Dresser 2013). As a result, until a SEIS (Supplemental Environmental Impact Statement) is completed, 17,000 acres and any newly identified infestations may be treated using only non-chemical methods. Continued herbicide use is site specific as outlined in the 2012 Partial Vacatur Opinion and Order. LJCRP includes sites covered under exhibit 1 (Approved treatment) of the Partial Vacatur. These sites were approved under the 92-94 Environmental Assessments and the 2010 EIS approved chemicals that can be used on these sites (Table 39).

**Table 39. Treatments in 2012-2013 using the 2012 Invasive Plant EIS Litigation Settlement Guidelines**(Beckijo Smergut, *pers.comm*)

Non-native plant species	Sum of acres
<i>Centaurea diffusa</i>	115.32
<i>Centaurea maculosa</i>	12.43
<i>Centaurea solstitialis</i>	4.51
<i>Cirsium arvense</i>	1.94
<i>Onopordum acanthium</i>	117.58
<i>Senecio jacobaea</i>	4.46
Grand Total	256.24

Additionally, the 2012 Partial Vacatur Opinions and Order allows for limited treatments consisting of spot and hand/select treatments outside of RHCA boundaries using herbicide formulations and mixtures containing one or more of eight active ingredients—clorsulfuron, clopyralid, glyphosate (excluding the Round-up formulation), imazapic, imazapyr, metsulfuron methyl, sethoxydim, and sulfometuron—of the sites listed on Exhibit 2. Table 40 lists the weed sites in the LJCRP area that fall into this category.

**Table 40. Limited treatments in 2012-2013 using the 2012 Invasive Plant EIS Litigation Settlement Guidelines**(Beckijo Smergut, *pers.comm*)

Non-native plant species	Sum of Acres
<i>Centaurea solstitialis</i>	18.09
<i>Onopordum acanthium</i>	282.05
Grand Total	300.14

The Wallowa Mountain Office of the WWNF considers all ODA A-listed weeds as high priority for treatment. The litigation has left notable weed infestations untreated, such as the Swamp Creek Meadow Hawkweed population, which covers patches of the flat parts of the meadow. Mechanical means are ineffective for meadow hawkweed, which is rhizomatous and able to sprout from roots and root fragments.

## Aquatic habitat

### *Proposed, threatened, endangered, and sensitive aquatic species*

Snake River steelhead (*Oncorhynchus mykiss*) were listed as threatened on August 11, 1997. Designated critical habitat was designated on September 2, 2005 and became effective on January 2, 2006. Snake River steelhead have been documented in the analysis area.

Steelhead are widely distributed in Joseph Creek including throughout the LJCRP analysis area. The current population level (abundance) of the Joseph Creek steelhead population has remained above 1,000 spawners (ICTRT 2010) since 1996 and is rated at very low risk (NOAA 2014). The Joseph Creek steelhead population currently meets the viability criteria with a viability rating of Highly Viable (ICTRT 2007).

Bull trout, Snake River fall Chinook salmon, and Snake River spring Chinook salmon are not present in the aquatic effects areas. Additionally, potential effects to aquatic habitat from the proposed activities will not extend into stream reaches occupied by these species downstream of the analysis area. Habitats for

other sensitive aquatic species for the WWNF are not present in the analysis area. Critical habitat for Snake River steelhead is present in the analysis area.

### *Management Indicator Species - Fish*

The National Forest Management Act (NFMA) directs the Forest Service to provide habitat to maintain viable populations of existing native and desired non-native vertebrate species. Management Indicator Species (MIS) were selected for emphasis in planning, and are assessed during forest plan implementation in order to determine the effects of management activities on their populations and the populations of other species with similar habitat needs. The amount and quality of habitat is used as a proxy for determining the effects of project activities on MIS.

Both steelhead and redband trout are MIS species for the forest plan. The analysis for each species will be done for each alternative described in this DEIS.

See Table 41 for miles of spawning and rearing habitat and miles of designated critical habitat for each of the listed and sensitive fish species within the project area by stream. Designated critical habitat for steelhead includes all occupied habitat and is the same as the distribution of the species.

**Table 41. Miles of habitat by stream for listed and sensitive fish species within the Lower Joseph Creek Restoration project area.**

Stream Name	Steelhead Habitat (Miles)			Redband Habitat (Miles)	
	Spawn	Rear	DCH	Spawn	Rear
Swamp Creek	21.1	21.1	21.7	21.7	21.7
Davis Creek	12.3	12.3	12.3	12.3	12.3
Cougar Creek	12.1	12.1	12.1	12.1	12.1
Green Gulch -Joseph Creek	13.2	13.2	13.2	13.2	13.2
Broady Creek	12.2	12.2	12.2	12.2	12.2
Horse Creek	9.9	9.9	9.9	9.9	9.9
Cottonwood Creek	18.8	18.8	18.8	18.8	18.8
Peavine Creek	10.0	10.0	14.0	14.0	14.0
Rush Creek	16.5	16.5	16.5	16.5	16.5
Sumac Creek	11.5	11.5	11.5	11.5	11.5
<b>TOTALS</b>	137.6	137.6	142.2	142.2	142.2

**DCH=Designated Critical Habitat. Steelhead DCH: Includes occupied habitat.**

Redband trout surveys have not been conducted in the LJCRP area. It is assumed that their abundance overlaps that of Snake River Steelhead and extends above this range particularly where barriers to anadromous fish exist.

Redband trout, the resident form of *Oncorhynchus mykiss*, are widely distributed in the LJCRP area and likely share a common gene pool with steelhead.

Redband trout are sensitive to changes in water quality and habitat. Adult redband trout are generally associated with pool habitats, although various life stages require a wide array of habitats for rearing, hiding, feeding, and resting. Pool habitat functions as important refugia during low water periods. An increase in sediment lowers spawning success and reduces the quantity and quality of pool and interstitial habitat. Other important habitat features include healthy riparian vegetation, undercut banks and LWD.

Spawning takes place from March through May. Redds tend to be located where velocity, depth and bottom configuration induce water flow through the stream substrate, generally in gravels at the tailout area of pools. Eggs incubate during the spring and emergence occurs from June through July depending on water temperatures. Redband trout may reside in their natal stream or may migrate to other streams within a watershed to rear. Habitat requirements are similar for redband trout and juvenile steelhead.

The amount of occupied MIS habitat on the Wallowa-Whitman National Forest ranges from about 320 miles to over 990 miles, depending on the species (**Table 42**). Based on GIS analysis, the amount of MIS habitat in the project area (14.6 – 137.6 miles) represents a small percentage of the overall miles of habitat for the entire forest. Redband trout are assessed for the miles of habitat that is not covered by the co-occupancy with steelhead. This is about 14.6 miles of habitat where there is only redband trout occupancy.

**Table 42. MIS distribution in the project area in relation to the Wallowa-Whitman National Forest range.**

MIS	Forest Distribution (mi)*	MIS in Analysis Area (mi)	Proportion of MIS habitat in Project Area out of total on Forest
Rainbow Trout/ Redband Trout	320	14.6	4.6
Steelhead	990	137.6	13.9

\*Miles calculated for the Wallowa-Whitman National Forest.

### *Regional Forester Aquatic Sensitive Species*

The western ridge mussel (*Gonidea angulata*) is the only aquatic Regional Forester sensitive species with potential distribution in the LJCRP area. Record reviews and data searches by WWNF personnel revealed that western ridge mussels were historically present in large numbers in the Snake River. This review confirmed that western ridge mussels are currently present in the Snake River, Hells Canyon portion, on the Hells Canyon NRA. The current Snake River western ridge mussel population is suspected to be at very low levels compared to pre-European settlement. Western ridge mussels have not been documented in the LJCRP area.

Threats to western ridge mussels and other species of freshwater mussels include loss of host fish, introduction of non-native fish, dams, channel modification from channelization and suction dredge mining, thermal pollution, chemical pollution, sedimentation and siltation from forest management and agricultural practices, water withdrawal and diversion, and livestock grazing in riparian areas. Since western ridge mussels require stable habitats, they may be particularly threatened by dewatering and other activities that cause shifting substrates, water level fluctuations, and seasonal loss of oxygen due to high temperatures or dewatering. Species that live for 20-30 years, as has been suggested for western ridge mussels, often appear to have healthy populations, when in reality only the older adults may be withstanding environmental changes and the population may no longer be reproducing.

### **Wildlife**

This analysis summarizes the terrestrial wildlife species found in the project area and the effects of the alternatives on these species. Rather than addressing all wildlife species, discussions focus on Forest Plan management indicator species (MIS), threatened, endangered and sensitive (TES) species, and landbirds. The existing condition is described for each species, group of species, or habitat. Direct, indirect and cumulative effects of alternatives are identified and discussed. The full wildlife specialist report and

supporting wildlife documentation is located in the Project Record, and includes detailed data, methodologies, analyses, conclusions, maps, references and technical documentation used to reach conclusions in this environmental analysis.

Viability of MIS is being assessed using the historical range of variability (HRV) concept that compares current amounts and distribution of habitat to historical conditions (Wisdom et al. 2000, Suring et al. 2011). Scientists assume that species are more likely to persist into the future under the conditions that remain most similar to the conditions that they persisted in during the past (Landres et al. 1999, Samson et al. 2002). It is assumed that maintaining habitat within HRV will provide adequate species population viability for the present suite of species. Individual species population viability is increasingly compromised as departure from HRV increases.

In general in the moist forest types the LJCRP area is low in the area of smaller trees, and is currently at the low end of large tree closed canopied habitat. Generally there is an abundance of medium and large-medium trees (10-20" dbh), and habitat >10" dbh with open canopies (<60% canopy closure) as compared to the range of variation. In the dry forests the LJCRP is below the range of variation in large tree, open canopied habitats, and above the range of variation in the medium and large-medium (10-20" dbh), closed canopied structural stages.

#### *Management indicator species - wildlife*

Table 6 (Chapter 1) lists the terrestrial species selected as MIS in the Wallowa-Whitman LRMP. All of these MIS have habitat and occur in the planning area, with the exception of American Marten, whose presence in the LJCRP area is unknown.

#### **Primary cavity excavating birds**

Primary cavity excavating (PCE) birds (woodpeckers) depend on standing and down dead wood for nesting, roosting, and foraging. By providing adequate dead wood habitat for these birds, it is assumed that adequate habitat will be provided for other species that rely on dead wood for all or part of their life histories. Because these MIS were selected to represent dead and defective wood habitat, this analysis and discussion focuses primarily on that habitat component. Table 43 summarizes the current conservation status of cavity excavating birds on the MIS list. Additional information on cavity-excavating birds' habitat associations, distribution and life history requirements is summarized in Mellen-McLean et al. (2012).

A few of the MIS woodpeckers are discussed in more detail due to conservation concerns. The pileated woodpecker is also MIS for old-growth habitats and further discussed in the old-growth habitat section of this document. More detailed discussions of white-headed and Lewis' woodpeckers are found in the sensitive species section.

**Table 43. Conservation status of cavity-nesting MIS**

Species	USFS Sensitive	NatureServe Ranks <sup>1</sup>	
		Global	OR
Black-backed woodpecker		G5	S3
Downy woodpecker		G5	S4
Hairy woodpecker		G5	S4
Lewis's woodpecker	Yes	G4	S2S3
Northern flicker		G5	S5
Northern three-toed woodpecker		G5	S3
Red-naped sapsucker		G5	S4
White-headed woodpecker	Yes	G4	S2S3

Species	USFS Sensitive	NatureServe Ranks <sup>1</sup>	
		Global	OR
Williamson's sapsucker		G5	S4B S3N
Pygmy nuthatch		G5	S4
Red-breasted nuthatch		G5	S5
White-breasted nuthatch		G5	S4
Black-capped chickadee		G5	S5
Chestnut-backed chickadee		G5	S5
Mountain chickadee		G5	S4

1/ NatureServe Ranks (NatureServe 2010): G5 or S5 = widespread, abundant, secure; G4 or S4 = apparently secure; G3 or S3 = vulnerable; G2 or S2 – Imperiled

In general, populations of cavity nesting birds have declined across the Blue Mountains compared to historical conditions, primarily due to reductions in the numbers of large snags (Wisdom et al. 2000). However, of the cavity excavating MIS, Breeding Bird Surveys in Oregon have only detected a significant decrease in populations of the northern flicker between 1966 and 2010 (Sauer et al. 2011).

Current forest plan direction, as amended by the Eastside Screens, is to maintain snags at 100% of biological potential for all woodpecker species that occur on the Forest. This equates to 2.25 snags/acre >12" dbh and 0.14 snags/acre > 20" dbh. Snags can be averaged over an area no larger than 40 acres. The desired condition is to maintain snags in a clumped distribution.

Rose et al. (2001) report that monitoring indicates that the biological potential models are a flawed technique. New information about the ecology, dynamics, and management of decayed wood has been published since then, and the state of the knowledge continues to change. However, until the forest plan is amended to reflect the new science, 100% biological potential is the minimum number of snags that need to be maintained through the life of the stand.

Integration of the latest science is incorporated into this analysis using DecAID Advisor (version 2.2) (Mellen-McLean et al. 2012), which is an internet-based summary, synthesis, and integration (a "meta-analysis") of the best available science, including published scientific literature, research data, wildlife databases, forest inventory databases, and expert judgment and experience.

Data from unharvested plots are assessed separately and these data can be used as a reference condition to approximate HRV of dead wood. There is debate among professionals on the impact fire exclusion has on stands relative to HRV of dead wood. One caveat to using these data is, "*On the eastside in particular, current levels of dead wood may be elevated above historical conditions due to fire suppression and increased mortality, and may be depleted below historical levels in local areas burned by intense fire or subjected to repeated salvage and firewood cutting*" (Mellen-McLean et al. 2012). Even with this caveat, the data are used in this analysis because they are still some of the best data available to assess HRV of dead wood, even in eastside dry forests; they are the only available data showing distribution and variation in snag and down wood amounts across the landscape; and the data from unharvested stands are in the range of other published data on HRV of dead wood even in the drier vegetation types. For a full discussion see HRV Dead Wood Comparison (Mellen-McLean 2011).

A distribution analysis<sup>10</sup> was used to determine how close current conditions for dead wood on the landscape match reference conditions. Existing conditions for down wood were derived by using Gradient Nearest Neighbor (GNN) data<sup>11</sup>. GNN data are based on 2011 imagery.

The distribution analysis results are then compared to the needs of woodpecker species using tolerance levels and intervals (range between 2 tolerance levels) from DecAID. Tolerance intervals are estimates of the percent of all individuals in the population that are within some specified range of values. See the wildlife specialist's report for specific snag densities by tolerance level.

The PPDF and EMC wildlife habitat types occur in the analysis area. Results of the DecAID distribution analysis are displayed in Figures 2-3.

In the Ponderosa Pine/Douglas-fir Wildlife Habitat Type (PPDF WHT), the landscape is near or above reference conditions for densities of large snags (>20"), and for snags >10" in density classes < 8 snags/acre (Figure 2). There is less area lacking snags (0 snags/acre) than would be expected under reference conditions, and more area in the lower snag density classes. Most woodpecker species using this WHT should currently have an adequate amount of snag habitat on the landscape. The exception is those species using high densities of small snags in recent post-fire habitats (e.g., black-backed woodpecker). Large snag habitat for pileated woodpecker and Williamson's sapsucker is rare in this WHT both currently and with reference conditions.

In the Eastside Mixed Conifer Wildlife Habitat Type (WHT), the landscape is deficit in snags density classes above 2 per acre for large (> 20" dbh) snags, as compared to reference conditions (Figure 3). Snag habitat for cavity-nesting birds is generally below reference conditions for densities of both large (>20") and small (>10") snags as more area is within the snag density class of 0 snags/acre than would be expected. In the higher density classes, especially the highest density classes, the area is currently below reference condition. These snag density classes (in deficit) provide habitat above the 30% tolerance level for pileated woodpecker and Williamson's sapsucker. Large snag habitat for those two species may be limiting in this WHT and the 2 woodpeckers may be limited to more productive sites in this WHT where snag densities are expected to be higher (Bull et al. 2006, Ohmann and Waddell 2002).

The amount of the landscape in the highest density classes for snags may be somewhat inflated due to an excess of dense stands with smaller trees susceptible to mortality than likely occurred historically. In addition, the data used in the calculation of reference conditions are from the late 1990s when spruce budworms were active in the Blue Mountains which created high levels of tree mortality.

### Pileated woodpecker

The pileated woodpecker is an MIS for both dead and defective wood habitat and old growth habitats. For additional details see Mellen-McLean (2012a) in the analysis file. Also see the body of work by Evelyn Bull in the Blue Mountains (Bull 1987, Bull and Holthausen 1993, Bull et al. 2005a, Bull et al. 2007, Nielsen-Pincus and Garton 2007).

Pileated woodpeckers are associated with late-seral stages of the subalpine, montane, lower montane forests, specifically, the old-forest single- and multi-strata stages of mixed conifer forests (Wisdom et al. 2000). Stands of pure ponderosa pine typically lack the abundance of snags and downed wood necessary for foraging habitat for pileated woodpeckers (Bull et al. 2007). In the Blue Mountains, densities of nesting pairs of pileated woodpeckers were positively associated with the amount of late structural stage forest and negatively associated with the amount of area dominated by ponderosa pine and the amount of area with regeneration harvests (Bull et al. 2007).

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<sup>10</sup> <http://www.fs.fed.us/r6/nr/wildlife/decaid-guide/distribution-analysis-green-tree.shtml>

<sup>11</sup> <http://lemma.forestry.oregonstate.edu/data/plot-database>

Snags, down logs, and large hollow trees are important habitat components for pileated woodpeckers. Large ponderosa pine and western larch snags are used for nesting and roosting (Bull 1987). Bull and Holthausen (1993) found that density of large snags (> 20 inches dbh) was the best predictor of density of pileated woodpeckers in the Blue Mountains. The woodpeckers also use large, decadent trees and hollow grand fir for roosting (Bull et al. 1992). Large snags and down logs are important foraging substrate for pileated woodpeckers in the Blue Mountains (Bull 1987).

Pileated woodpeckers are considered vulnerable in the state by ODFW<sup>12</sup>. However, they are considered “apparently secure” in Oregon by NatureServe. Due to an increase in dense, multi-canopy stands due to fire suppression, habitat for pileated woodpeckers is increasing across the Blue Mountains (Wisdom et al. 2000). However, densities of large-diameter snags (>20 inches dbh) have declined from historical to current levels (Wisdom et al. 2000, Korol et al. 2002).

As discussed in Chapter 1, densities of large snags (>20 inches dbh) in the Eastside Mixed Conifer (EMC) WHT are below reference conditions in the snag density classes that provide habitat for pileated woodpeckers (Figure 2, Chapter 1). Snag habitat is likely to be a limiting factor for pileated woodpeckers in the EMC habitat types (moist forest PVG).

A viability assessment completed for the LRMP Revision indicates a moderate viability concern for the pileated woodpecker on the Wallowa-Whitman National Forest; suitable environments are moderately distributed and/or exist at moderate abundance across the historical range of the species (Wales et al. 2011).

Due to an increase in dense, multi-canopy stands due to fire suppression, structural conditions used by Pileated woodpeckers may have increased on drier ponderosa pine sites. However, this habitat type does not produce large-diameter snags (>20 inches dbh) in densities used by Pileated woodpeckers (Figure 1, Chapter 1).

### American marten

The American marten is an MIS for old growth habitats. For additional details see Mellen-McLean (2012b) in the analysis file. Also see the body of work led by Evelyn Bull in the Blue Mountains (Bull 2000{Bull, 1999 #689, Bull and Heater 2000, Bull et al. 2005b).

American marten are associated with old multi- and single-story, and unmanaged young multi-story structural stages in subalpine and montane forests. Large snags and down logs provide rest and den sites for marten. (Wisdom et al. 2000)

In the Blue Mountains, marten selected unharvested, closed canopy (50-75%), old-structure stands in subalpine fir, spruce, grand fir, and lodgepole forests (Bull et al. 2005b). Stands used by martens had higher densities of large snags (>20 inches dbh), averaging 4.0 snags/acre. Snags used as resting and denning sites average from 26 to 38 inches dbh in eastern Oregon, depending on habitat type (Mellen-McLean et al. 2012).

In addition to providing rest and den sites, down wood is an important component of marten habitat because their primary prey is small mammals associated with down wood. These small mammals include voles (*Microtus sp.*) red-backed voles (*Clethrionomys gapperi*), snowshoe hares (*Lepus americanus*) and squirrels in northeast Oregon (Bull and Blumton 1999, Bull 2000). Subnivean (under snow) spaces created by logs provide marten with access to prey during the winter (Bull and Blumton 1999). Down wood used as den and rest sites in the Blue Mountains averaged 26 inches dbh (Bull and Heater 2000).

<sup>12</sup> [http://www.dfw.state.or.us/wildlife/diversity/species/docs/SSL\\_by\\_taxon.pdf](http://www.dfw.state.or.us/wildlife/diversity/species/docs/SSL_by_taxon.pdf)

American marten are considered vulnerable in the Blue Mountains by ODFW<sup>13</sup>, however, they are also a hunted species. They are considered “vulnerable” to “apparently secure” in Oregon by NatureServe<sup>14</sup>. Reduction in amount of late-seral forest and associated large snags and logs, and associated fragmentation of habitat are the main reasons marten are considered vulnerable (Wisdom et al. 2000, Hargis et al 1999).

Due to an increase in dense, multi-canopy stands due to fire suppression, habitat for American marten is increasing across the Blue Mountains (Wisdom et al. 2000). However, densities of large-diameter snags (>20 inches dbh) have declined from historical to current levels (Wisdom et al. 2000, Korol et al. 2002).

Densities of large snags (>20 inches dbh) in the EMC WHT are below reference conditions in the snag density classes that provide habitat for American marten (See the wildlife specialist’s report for more information on tolerance levels for American marten). Snag habitat is likely to be a limiting factor for marten in these habitat types.

A viability assessment completed for the Wallowa-Whitman forest plan revision (USDA Forest Service 2014) indicates a low to moderate concern for the American marten on the WWNF. Historically, habitat was of moderate to low abundance with gaps in distribution, and these currently conditions are similar at the scale of the Forest (Wales et al. 2011).

The American marten is one of the most habitat-specialized mammals in North America (Bull and Heater 2001). Marten in northeastern Oregon exhibited larger home ranges than those found in many studies with an average home range size of 6,714 acres for males and 3,499 acres for females (Bull and Heater 2001). Bull and Heater (2001) recommended managing larger areas (16.78 mi<sup>2</sup> (10,739 acres) per breeding pair) for marten in northeastern Oregon. Martens respond negatively to low levels of habitat fragmentation (>25%) (Hargis et al. 1999), and Bull and Blumton (1999) found declines in red-backed voles, red squirrels, and snow shoe hares in fuel reduction harvests, which are primary prey items for martens. Furthermore, martens avoided all harvested stands and stands with less than 50 % canopy closure (Bull et al. 2005b).

Potential habitat for marten in the LJCRP area is limited. Currently there are 9,833 acres of potential habitat of which about 1,829 acres is source habitat in the project area (17% of the potential). Source habitat was described as those areas in moist forest with large trees ( $\geq 21''$ ), and closed canopy conditions ( $\geq 60\%$ ).

Currently the project area contains about 17% of the potential as source habitat, which is just below or at the lower end of the HRV for this habitat type (median HRV is 24% of potential source habitat area).

## Northern goshawk

The northern goshawk is a MIS with nesting requirements associated with forested habitat with late/old structure (LOS), but will use a variety of forest structure types for other life history needs. It is an indicator of the abundance and distribution of mature and old-growth forests. Life history, risk factors, conservation status and population trend, as well as habitat condition and species viability are described in detail in the Northern Goshawk (*Accipiter gentilis*) Management Indicator Species Assessment, Wallowa-Whitman National Forest (Penninger and Keown 2011c). Wales (2011c) analyzed source habitat of numerous wildlife species of interest in the Blue Mountains and WWNF in support of the Blue Mountains Forest Plan Revision. Source habitats are defined by Wales (2011c) as those stands that provide for a stable or increasing population and for all the life history needs of the goshawk including nesting, roosting, foraging, resting, travel, and dispersal. Potential habitat is defined as stands within dry Douglas-fir, dry grand fir, cool moist, and cold dry plant association groups that have the capability to provide

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<sup>13</sup> [http://www.dfw.state.or.us/wildlife/diversity/species/docs/SSL\\_by\\_taxon.pdf](http://www.dfw.state.or.us/wildlife/diversity/species/docs/SSL_by_taxon.pdf)

<sup>14</sup> <http://www.natureserve.org/explorer/servlet/NatureServe>

source habitat but that currently do not provide the tree size, canopy cover, or structural conditions. Given time and lack of human intervention or disturbance these areas may provide source habitat.

Wales (2011c) estimated that approximately 466,679 acres of source habitat existing on the WWNF historically. Currently, approximately 440,696 acres (94% of estimated historical conditions) of source habitat occurs on the WWNF. Source habitat for the goshawk is identified as forests with >15" DBH and closed canopies (dry forests canopy closure  $\geq 40\%$ , moist forest canopy closure  $\geq 60\%$ ). The risk and habitat quality factors were the abundance of forests with trees >20" and closed canopy as well as habitat effectiveness. Primarily as a result of an abundance of source habitat in many areas above the median HRV, the viability of goshawks in the Blue Mountains was calculated to currently be an A outcome (Wales et al. 2011). An "A" outcome is described as 'suitable environments are broadly distributed and of high abundance across the historical range of the species.'

The existing condition within the Lower Joseph Creek watershed contains 19,362 acres of source habitat for the northern goshawk. This corresponds to about 55% of the potential habitat. The HRV for this species that was calculated as a mean across all watersheds on the Wallowa-Whitman NF (Wales et al. 2011, USDA Forest Service 2014) found the range to be 1-46%. Currently goshawk habitat is above the HRV in the LJCRP area.

#### *Old growth management areas, late-old forest habitat, and connectivity corridors*

Three species were selected in the forest plan to represent old growth habitats that have habitat in the LJCRP area: pileated woodpecker, American marten, and goshawk. The Forest Plan designated old growth management areas (Management Area 15; MA15) and provides standards and guidelines (Forest Plan 4-89 through 4-91) for their management. Habitat for these species is discussed specifically above. This section focuses on old forest habitat, including areas designated as MA15, and connectivity corridors for wildlife species dependent on these habitats.

Late and old structure forest habitat is defined by the Eastside Screens as single and multi-strata stands with large trees, by proxy. A large tree is defined as being  $\geq 21$  inches dbh. Multi-stratum stands are comprised of two or more tree canopy layers and two or more cohorts of trees. Medium and large sized trees dominate the overstory but trees of all size classes may be present. Stand structure and tree sizes are diverse. Single stratum late, old structure stands are comprised of a single dominant canopy stratum consisting of medium or large sized trees. Large trees are common. Young trees are absent or few in the understory. The stand may appear "park-like."

The large-open structural stage of the dry forest PVG is below HRV, defined as conditions in the pre-European settlement area. Low amounts of this habitat limit the abundance of wildlife species associated with late and old structure forest habitat in the area, such as the northern goshawk, flammulated owl, white-headed woodpecker, pygmy nuthatch, white-breasted nuthatch, and brown creeper.

Connectivity between MA15 and late old structure (LOS) stands was assessed utilizing field reconnaissance, aerial photographs and GIS mapping. The current level of connectivity between MA15 and LOS stands varies across the project area. Areas of non-forested vegetation in combination with past timber harvest and wildfires have created gaps of varying size across the project area. Several LOS stands are currently somewhat isolated by their adjacency to areas non-forested vegetation. Stands of more contiguous forest in the northern portion of the project area are currently well connected (Maps 7 and 8, Appendix A). In the southern part of the project area, connectivity is largely through major riparian areas such as Swamp Creek and Davis Creek. This connectivity discussion is pertinent to all wildlife species mentioned elsewhere, particularly those that utilize LOS habitat for any part of their life history. Pileated woodpecker, American marten and their prey, goshawk and their prey, elk, and a variety of other vertebrates and invertebrates are affected by the level of connectivity between their source or preferred habitats. The connectivity network was established based generally on stand boundaries and connects, to

the extent possible, all LOS and MA15 stands within and outside the project area according to direction in the forest plan amendment #2.

There are 31 Forest Plan allocated MA15 areas in the LJCRP area. These stands are intended to maintain habitat diversity, preserve aesthetic values, and to provide old-growth habitat for wildlife. In total, the area within MA15 is 3,081 acres of which 111 acres are not forested, for a total of 2,907 forested acres. See Table 44 for a description of the existing structural stages.

**Table 44. Current distribution of forest structural stages in areas designated as old growth management areas (MA15) in the Lower Joseph Creek Restoration Project area (see Figure 7 for a description of structural stages).**

	Old forest multi-story (OFMS)	Old forest single-story (OFSS)	Young forest multi-story (YFMS)	Understory reinitiation (UR)	Stem exclusion (SE)	Stand initiation (SI)	Total
Total	1,481	14	206	678	592	0	2,970
Dry forest PVG	913	0	142	397	417	0	1,869
Moist forest PVG	567	14	65	281	174	0	1,101

## Elk

Rocky Mountain elk are a management indicator species for the WWNF. Elk have been selected as an indicator of habitat diversity, interspersed cover and forage areas, and security habitat provided by areas of low human disturbance. Elk management on the WWNF is a cooperative effort between the Forest Service and the Oregon Department of Fish and Wildlife (ODFW). The Forest Service manages habitat while ODFW manages populations by setting seasons, harvest limits, and goals for individual Wildlife Management Units (WMU). Within the Lower Joseph project area there are parts of two WMUs: Chesnimus and Sled Springs (Figure 7).

### *Habitat Effectiveness Index (HEI)*

HEI values are based on a comprehensive elk habitat model developed by Thomas et al. (1988). These values consider the interaction of size and spacing of cover and forage areas, density of roads open to vehicle traffic, forage quantity and quality, and the quality of cover. For this report, HEI values were calculated without a forage quality value since actual data does not exist.

Currently the Lower Joseph project area is meeting the LRMP direction of  $HEI \geq 0.5$  in the MA 1 (timber emphasis, summer range) areas (Figure 8, Table 45).

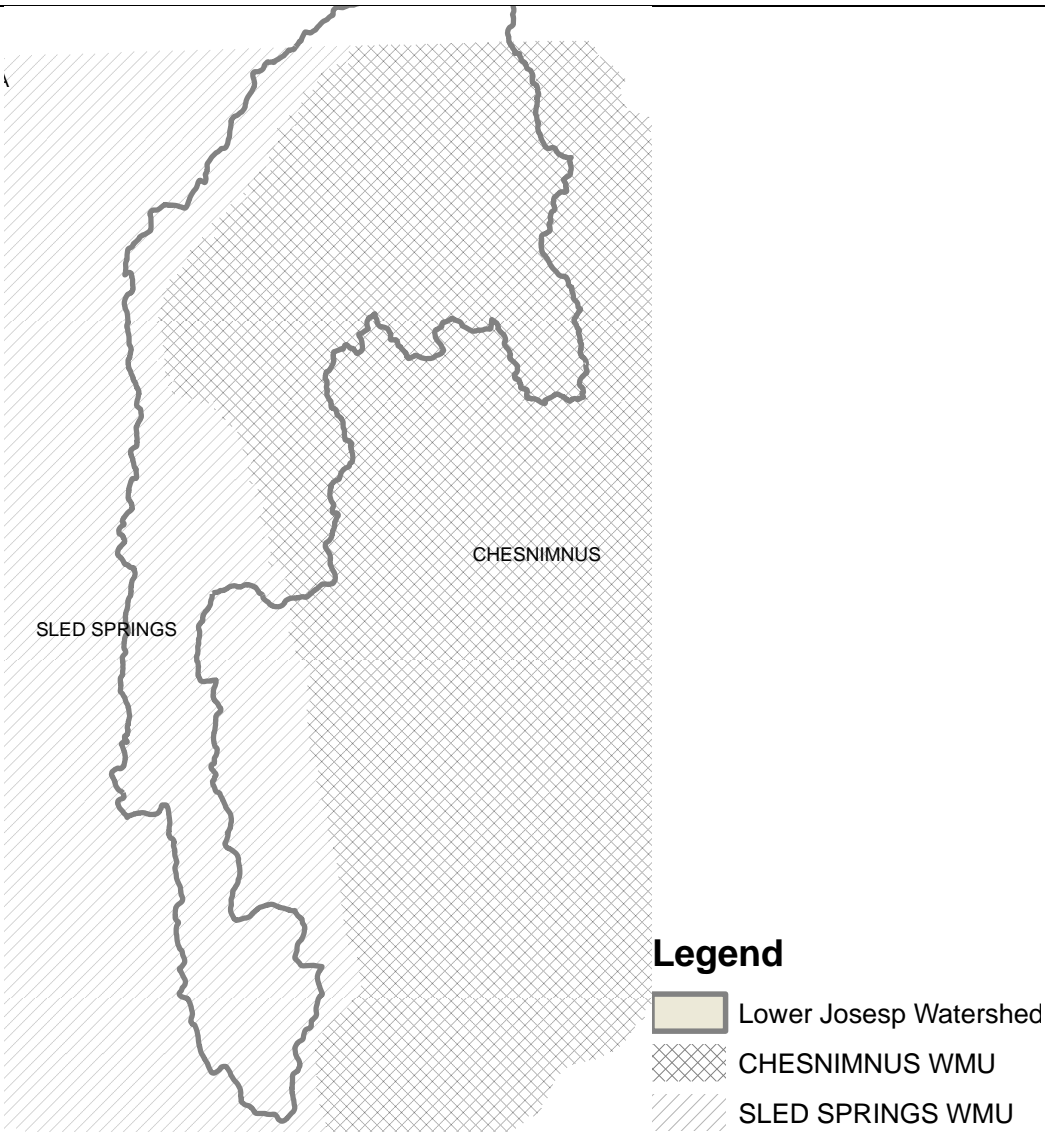
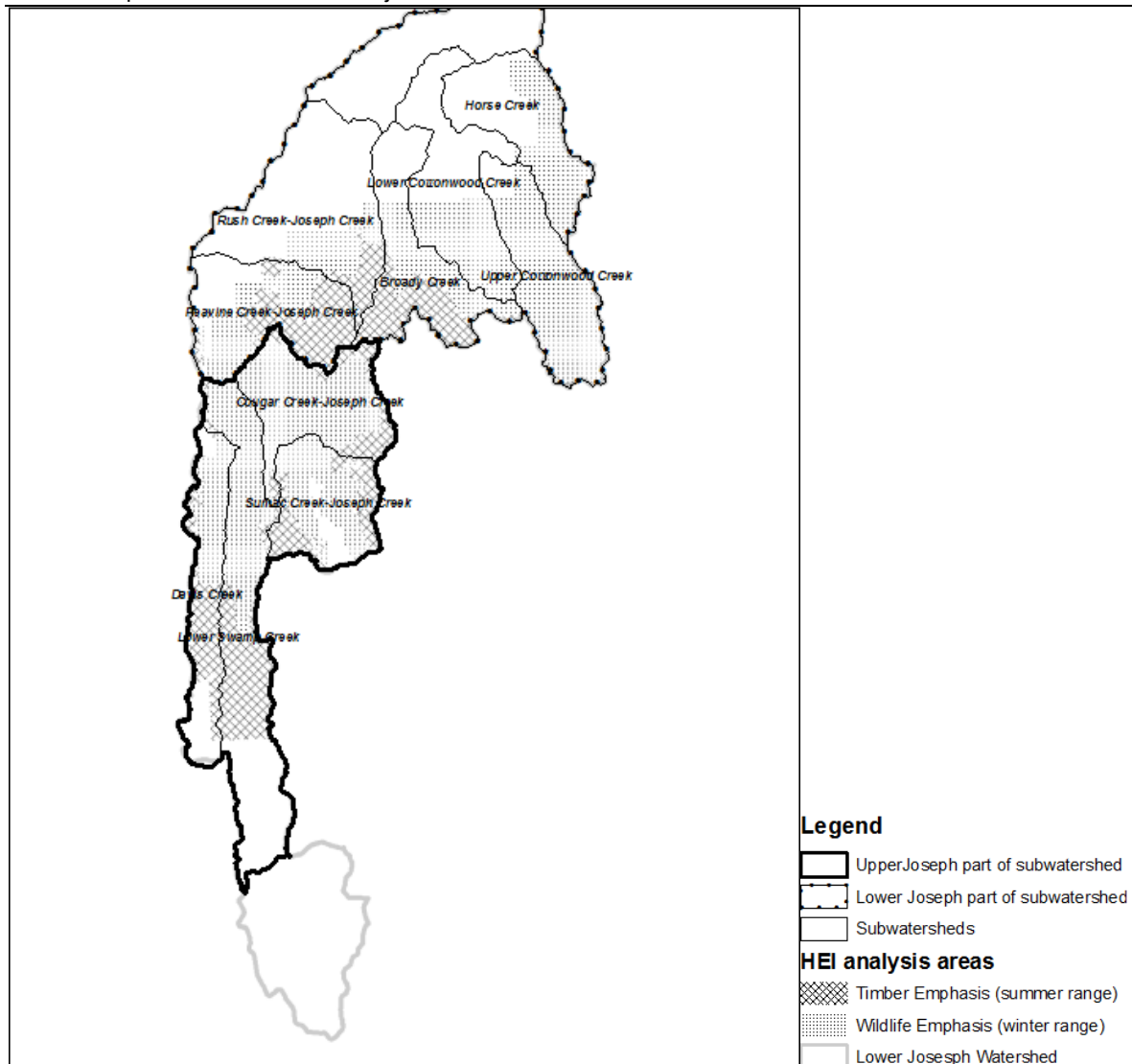


Figure 7. Wildlife management units in the Lower Joseph Creek Restoration Project area



**Figure 8. Timber and wildlife emphasis management areas used to analyze an elk habitat effectiveness index (HEI) for the LJCRP area.**

A cover to forage ratio is used to describe the relative amounts of cover to forage and while the optimal ratio of cover to forage is 40:60 (Thomas 1979). The LRMP establishes a minimum standard that at least 30% of forested land be maintained as cover in the Timber Emphasis areas (MA1, MA11). For this analysis we defined 'Forage' as areas with <40% canopy closure. 'Marginal' cover is defined as areas with 40-60% canopy cover, and 'Satisfactory' cover refers to areas with  $\geq 60\%$  canopy closure. We used these definitions as that was the scale of the data available.

Currently in both the Lower and Upper Joseph watersheds in the summer range there is  $\geq 55\%$  cover, in the MA1 (timber emphasis, summer range) areas (Figure 8, Table 45).

**Table 45 – HEI and Cover percentages for desired (forest plan) and existing conditions within the Lower Joseph project area.**

	Forest Plan direction	Existing condition			
		Timber Emphasis (summer range)	Wildlife Emphasis (winter range)	Timber Emphasis (summer range)	Wildlife Emphasis (winter range)
		Lower Joseph Watershed		Upper Joseph Watershed	
Total Cover %	MA 1 >= 30% (summer range)	77%	23%	55%	30%
Cover:Forage		77:23	23:77	55:45	30:70
Marginal Cover %		35%	11%	26%	14%
Satisfactory Cover %		42%	13%	28%	16%
Forage %		23%	77%	45%	70%
Marginal Acres		4,634	4,078	4,408	4,134
Satisfactory acres		5,583	4,901	4,743	4,756
Forage acres		3,047	29,750	7,589	20,570
HEI	MA 1 >= 0.5 (summer range)	0.63	0.63	0.57	0.71

### *Road Densities*

Motor vehicle access and associated human activities are widely recognized as an important factor in how wild, free-ranging elk distribute themselves across available habitat. As the amount and frequency of motor vehicle access increases, habitat effectiveness decreases (Lyon 1983). A literature review by Gagnon et al. (2007) found that 84 percent of 53 literature sources identified an effect to elk from motor vehicle traffic. Gagnon et al. goes on to explain that the remaining 16 percent of sources claiming little effect to elk from traffic cited differences in ungulate populations, ungulate behavior, or landscape variables that explained the reduced effect from traffic. In the book, *North American Elk Ecology and Management* (Toweill and Thomas 2002), Lyon and Christensen characterize the body of research showing roads having a “consistent year-round influence” on elk’s use of the environment as “overwhelming.”

Within this project area there is the Chesnimnus Cooperative Travel Management Area. This is a joint agreement between the Wallowa-Whitman NF and the Oregon Department of Fish and Wildlife where there are identified seasonal road closures. The closures are in effect 3 days prior to the rifle bull elk season through the end of the rifle bull season (approximately 10/25 – 11/27). The objectives of this closure are to protect soils and wildlife habitat, minimize harassment of wildlife, maintain adequate bull escapement, and promote quality hunting.

The LRMP direction for road densities by management areas calculated at a subwatershed is: MA1 <= 2.5 mile/square mile; MA3 <= 1.5 mile/square mile; and HCNRA <= 1.5 mile/square mile. The road density estimate does not take into account off-road vehicle use on OHV trails or closed roads, or cross-country travel. The current road densities by management area per subwatershed for the Lower Joseph project area are shown in Table 46.

**Table 46. Road densities by management area and subwatershed, currently, and by alternative for the Lower Joseph project area.**

Subwatershed		MA 1 Open Road Density (mi/mi <sup>2</sup> )	MA 3 Open Road Density (mi/mi <sup>2</sup> )	HCNRA CMP Open Road Density (mi/mi <sup>2</sup> )
	Forest Plan Standard	2.5	1.5	1.35
Broady Creek	Current	2.8	1.2	1.4
	Alt. 1	1.6		1.4
	Alt. 2	1.6	-	1.1
	Alt. 3	2.7	0.3	1.1
Cougar Creek	Current	4.3	0.9	
	A1	3.7	0.7	
	A2	3.2	0.4	
	A3	3.5	0.8	
Davis Creek	Current	4.1	0.2	
	A1	4.0	0.2	
	A2	2.8	0.2	
	A3	4.0	0.2	
Horse Creek	Current			1.7
	A1			1.7
	A2			1.5
	A3			1.7
Lower Cottonwood Creek	Current			0.5
	A1			0.5
	A2			0.5
	A3			0.5
Lower Swamp Creek	Current	3.0	0.3	
	A1	2.7	0.3	
	A2	2.7	0.3	
	A3	3.0	0.3	
Peavine Creek	Current	2.5	0.2	
	A1	1.2	0.2	-
	A2	1.2	0.2	-
	A3	2.5	0.2	-
Rush Creek	Current	4.1	0.9	
	A1	3.3	0.5	-
	A2	3.0	0.5	-
	A3	3.9	0.8	-
Sumac Creek	Current	4.3	1.4	

	A1	3.6	1.2	
	A2	2.8	1.2	
	A3	4.0	1.3	
Upper Cottonwood Creek	Current			0.7
	A1			0.7
	A2			0.7
	A3			0.7

### Threatened, endangered, and sensitive wildlife species

The list of federally-listed species applicable to the planning area was obtained from the U.S. Fish and Wildlife Service (USDI Fish and Wildlife Service 2011). No proposed or federally-listed terrestrial wildlife species were described for Wallowa County, Oregon. The USFS Region 6 Regional Forester's Sensitive Species List (Appendix E), dated January 31, 2011 (USDA Forest Service 2011) was reviewed for sensitive species potentially applicable to the LJCRP area.

#### *U.S. Forest Service Region 6 sensitive wildlife species*

Table 6 (Chapter 1) summarizes the Regional Forester's list of sensitive wildlife species (Also see Appendix E) with habitat suspected or known to be in the LJCRP area (USDA Forest Service 2011). Table 6 also describes their habitat conditions.

#### *Landbird and migratory bird habitat*

##### Breeding Bird Survey

The Breeding Bird Survey (BBS) (Robbins et al. 1986) is the primary source of population trend information for North American landbirds. However, it only has data for the last 30 years, and extensive habitat changes occurred prior to that time which undoubtedly affected bird populations, but for which there are no quantitative data. Attempts to assess the extent of bird population changes prior to the BBS have been documented through an examination of historical habitats at the time of European settlement (approximately 1850) and knowledge of bird species habitat relationships (Wisdom et al. in press). There is one BBS Physiographic Region within the geographic boundaries of this conservation strategy (Central Rocky Mountains). This BBS physiographic region occurs mostly outside of Oregon and Washington, including parts of Idaho, Montana, and Colorado. Thus, BBS population trend estimates should be viewed cautiously because they may not reflect populations in Blue Mountains of Oregon and Washington. Table 7 (Chapter 1) lists bird species with significantly declining trends as measured by the BBS.

##### Partners in Flight Bird Conservation Regions (BCR'S) and Bird Conservation Plans:

The Oregon and Washington Chapter of Partners in Flight (PIF) was formed in 1992 and has since developed a series of publications aimed at assisting private, state, tribal and federal agencies in managing for landbird populations. Five avian conservation plans have been developed by PIF covering the various geographic regions found in Oregon and Washington. These documents have been prepared to stimulate and support a proactive approach to the conservation of landbirds throughout Oregon and Washington. Recommendations included in the documents are intended to inform planning efforts and actions of land managers, and stimulate monitoring and research to support landbird conservation. They also serve as a foundation for developing detailed conservation strategies at multiple geographic scales to ensure functional ecosystems with healthy populations of landbirds. The Plan reviewed and incorporated for this project is: *Conservation Strategy for Landbirds in the Rocky Mountains of Eastern Washington and Oregon*.

Bird Conservation Regions (BCRs) are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. The BCR that is within the planning area is BCR 10 the Northern Rocky Mountain's. In December, 2008, the U.S. Fish and Wildlife Service released *The Birds of Conservation Concern Report* (BCC) which identifies species, subspecies, and populations of migratory and resident birds not already designated as federally threatened or endangered that represent highest conservation priorities and are in need of additional conservation actions. The goal is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. It is recommended that these lists be consulted in accordance with *Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds."*

Table 7 (Chapter 1) lists the birds of conservation concern for the Northern Rockies BCR, excluding those not known to occur, or without habitat in the LJCRP area.

*The Conservation Strategies for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington*, as well as the Fish and Wildlife Service (FWS) BCC species list for the project area were reviewed and incorporated into this analysis. Those species and habitats that are within the project area are incorporated and effects disclosed later in this document.

## **The social environment**

### **Pre-contact historical environment**

Prior to European settlement, the area was used by people of the Nez Perce Tribe for traveling from Wallowa Valley to wintering sites along the Grande Ronde and Snake Rivers. The area attracted elk, bighorn sheep, and mule deer that were used for subsistence during the winter months. The bunchgrass communities also provided roots, bulbs, and fresh greens to native inhabitants. After modern horses became available, Tribal horse herds grazed the canyon grasslands. European settlement brought homesteading and cattle ranches to the area, but the steep, rocky terrain within the Lower Joseph Creek project area limited the expansion of hay, grain and vegetable production (Sondena and Kozusko 2003b). Since establishment of the Wallowa-Whitman National Forest<sup>15</sup>, land management activities have included timber harvest, livestock grazing, hunting, fishing, and recreational uses such as camping and hiking.

### **Socioeconomics**

The WWNF operates as a steward of many natural amenities that relate to changes in population, employment and income, supports a portion of area population and employment growth, and thus plays a principal role in the community. The WWNF lies within Wallowa, Union, Baker, Malheur, Umatilla, and Grant Counties in Oregon; Adams, Idaho, and Nez Perce Counties in Idaho; and Asotin County in Washington.

Wallowa and Union counties comprise the economic analysis area for the economic impact analysis for this DEIS. Together, the two counties contain many of the businesses that will likely complete the contracted restoration work, the facilities that will process much of the commercial timber material removed, and represent the functional economy for many of the individuals residing and working in the area.

The social analysis area was based on the area with likely social impacts from this project, which includes Wallowa County and the Nez Perce Tribe, as discussed below. The majority of project scoping comments were from Wallowa County and the expected social effects on communities from the LJCRP are

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<sup>15</sup> The Wallowa National Forest was established in 1905, the Whitman NF in 1908, and the two were combined to become the Wallowa-Whitman National Forest in 1954.

anticipated to occur in this area. However, IMPLAN data does not include the Nez Perce Reservation so this social analysis area was included only where data was available.

It is important to capture the Nez Perce (Nimi'ipuu) communities in the social analysis area since they are expected to be impacted by the LJCRP. The Nez Perce Reservation lies in Nez Perce, Lewis, Clearwater and Idaho counties in Idaho. The LJCRP will impact the communities on the Reservation through their traditional and subsistence cultures if the members travel for resources on the WWNF land. Historically, "the Nimi'ipuu traveled across Oregon, Washington, and Idaho. The traditional homeland of the Nimi'ipuu is North Central Idaho, including areas in Southeastern Washington, Northeastern Oregon with usual and accustomed areas in Western Montana and Wyoming" (Nez Perce Tribe 2010). See the heritage and tribal relations specialist's report for more details on the use of the LJCRP area by the Nez Perce tribe.

See Chapter 3 and the socioeconomics specialist report for more information regarding population demographics, environmental justice, employment, income, timber market, forest products, and non market values

### Heritage resources

The Area of Potential Effect (APE) for the analysis area is based on the Proposed Action and the action alternatives and is bounded spatially by treatment unit boundaries. Up to 22,119 restoration acres of forest (proposed action/alternative 2) involve ground disturbance. Of this area, 5,200 acres lay within high, medium and medium-low cultural resource probability areas as outlined in the Wallowa-Whitman NF Stratified Inventory Probability System (on file, Wallowa Whitman National Forest, Supervisors office). These acres represent areas of likely effect thereby necessitating intensive inventory and design criteria where needed to protect cultural values.

Thirty five previous cultural resource inventories have been conducted between 1980 and 2005 within the LJCRP area resulting in the survey of 14,468 acres, and recording of 299 cultural sites. Previous and new inventories cover a total of 18,668 acres, or about 20% of the 98,000 acre analysis area, and more than 30% of proposed Alternative 2 and 3 treatment units.

Based on information gathered through archaeological inventory of current and previous cultural resource inventories, it is evident that the LJCRP area is rich in cultural and archaeological resources; many of which are National Register eligible sites. Of these eligible sites, 43 are located in, or near, proposed alternative 2 and 3 treatment units. All eligible sites will be protected from restoration treatments through the development of project implementation plans that will identify protection measures, or design features, in an effort to mitigate effects.

Felling trees, skidding and landing logs, road construction and decommissioning, grading native surface roads, and the operation of wheeled and tracked vehicles have the potential to impact heritage resources. Post-harvest activities often include piling and burning slash, obliterating temporary roads, and soil stabilization. Activities associated with mechanized silvicultural treatments have the highest potential to impact heritage resources because they involve the operation of industrial-scale logging equipment. Using the 2004 Programmatic Agreement as a guide (Region 6 Forest Service and Oregon State Historic Preservation Office, 2004) non-mechanized silvicultural practices (i.e., cutting trees with a hand operated chainsaw) have little potential to affect historic properties. Activities associated with prescribed burning such as low-intensity burns, line construction, and mop up—provided that historic properties sensitive to fire are avoided or protected—have moderate to low potential for effects.

Studies in experimental archaeology suggest that skidding logs can damage the upper 20cm of an archaeological site after just one skid {Philipek, 1985 #739}. Segin's (2005) studies in experimental archaeology indicate that tracked vehicles with 14 pounds of surface pressure per square inch can cause

vertical artifact displacement greater than 20 cm, and horizontal movement of more than 2 meters after just 6 passes of the tracked vehicle.

Long term timber management and grazing activities have been conducted within the LJCRP analysis area over the past one-hundred years. Historic activities such as skidding logs, temporary road construction have affected sites over that time span. Hunting and fuel wood gathering activities, which may include driving off existing roads, has also affected cultural resources. Even with past impacts, many sites still retain sufficient integrity to be considered eligible for the National Register of Historic Places.

### **Tribal relations**

The affected environment regarding Nez Perce Tribe interests involves lands ceded by treaty, including associated reserved rights, subsistence and cultural resources located in the LJCRP. The affected environment also involves the current conditions of the “Traditional Economy” (Silas Whitman, pers. comm. July 8, 2014). The traditional economy is guided by strong cultural values, tradition, beliefs and practices associated with a subsistence lifeway dependent upon fishing, hunting and gathering of treaty resources.

The Tribal Relations analysis uses largely a qualitative approach by comparing relative effects for each alternative with a focus on the Nez Perce Tribe’s values associated with the their “Traditional Economy”. This is an economy that is guided by tradition, beliefs and practices associated with a subsistence lifeway dependent upon fishing, hunting and gathering of treaty resources.

Many of the Tribes comments include concerns regarding the direct or indirect physical impacts on the land and its resources resulting from large scale restoration treatments. Therefore, effects analyses include scale of treatment (acres) as a metric to measure the relative degree of physical effects of the alternatives.

Values associated with the traditional, cultural and contemporary beliefs and practices surrounding land stewardship are of utmost importance to the Tribe and ongoing staff to staff coordination. The Tribal coordination and consultation record can be found in Appendix G.

The Tribal Relations effects analysis considers risks to the conservation of the Nez Perce traditional economy by taking into account rights, values, beliefs, and attitudes as derived from tribal input. Not all of the values, beliefs and attitudes are addressed in this analysis. However, the information shared through comments, consultation and staff to staff coordination provides the best information available.

Some tribal comments, concerns, values and beliefs required interpretation to more fully describe and disclose effects to Tribal values by alternative. In all cases these interpretations considered the tribe’s public comment responses, as well as issues shared at government to government consultation, or staff to staff, coordination meetings.

Nez Perce issues to be analyzed for effects are summarized below in Table 47. The Tribal Relations column includes traditional cultural values and will be addressed in this report. The Natural Resources column summarizes tribal concerns regarding management of treaty resource habitats and ecological conditions relative to wildlife, hydrology, aquatics, silviculture, road management, old growth, and botany. Tribal concerns specific to heritage or cultural resource management are addressed in the Heritage Resource Specialist Report.

**Table 47. Nez Perce comments considered for analysis of the LJCRP.**

<b>TRIBAL RELATIONS</b>	<b>NATURAL RESOURCE</b>
Impacts on hunting, fishing and gathering	Harm to treaty resource habitat (see all resource effects sections )
Need to address the true value of the landscape beyond economics	No treatments in riparian area unless demonstrate positive effects (see aquatics and hydrology effects sections)
Concern for water developments impacts *	Abandoned roads, run off erosion, sediment delivery; road decommissioning needed (see hydrology and soils effects sections)
Maintain old growth legacy trees	Properly functioning watersheds (see hydrology effects sections)
Federal compliance of treaty responsibilities *	Want upward trend in fish habitat, water, riparian conditions (see aquatics, hydrology, botany sections)
Resource risks of accelerated planning and restoration	Road density/road placement and relative to treaty resource values (see all effects sections)
Maintenance of administrative access and wildlife connectivity to the adjacent Precious Lands Wildlife Management Area *	Concern for ESA wildlife and native plant resource condition (see wildlife and botany effects sections)
Impacts to traditional plant resources, including the “traditional economy” of the Nez Perce Tribe ( NPTEC meeting 07-08-14)	Impacts to fish strongholds, particularly from roads and disturbance in RHCAs (see aquatics, roads, botany effects sections)
Conservation of inventoried road less areas	Achievement of riparian mgt objectives (see aquatics effects section)
Likely Traditional Cultural Properties, sacred sites and traditional use areas in project area. Need traditional use studies	Adequate heritage inventory to ensure protection during project implementation (See heritage effects section)

**\* Issues or concerns not analyzed for effects as they may be addressed outside environment analysis through ongoing consultation, partnerships or policy direction**

The following assumptions are considered in the effects analysis:

- Resources associated with traditional economy values are at risk from catastrophic fire, loss of structural and biological diversity and climate change.
- Overstocked stands reduce the sunlight available for shade intolerant traditional plants
- A lack of wild, low intensity fire is reducing regeneration of fire dependent traditional plants, forage, and browse
- Catastrophic wildfires are a threat to all landscape resource values as fire suppression has moved Ponderosa pine, and moist forest habitat, outside the range of variability.
- Restoration treatments that move landscapes towards ecological resiliency allow for increased biological and structural diversity that will benefit traditional foods and other cultural and treaty resources
- In the short term negative effects to settings and other tribal values resulting from restoration disturbance will be evident on the landscape but are expected to protect and enhance tribal values over the long term
- Resource data, Historic Range of Variability (HRV) models and climate change predictions are acknowledged for their uncertainty while providing the best available tools for analysis
- Some tribal members may prefer the No Action alternative due to the uncertainty surrounding the pace and scale of accelerated restoration objectives that are not “tried and true”.

Table 48 describes traditional plants known to be of interest to the Nez Perce Tribe. Table 48 does not include all of the traditional plants that may potentially exist in the LJCRP. This table only includes plants that are known to be of interest as documented in the Nez Perce Seasonal Round plants (Figure 9), and that were mentioned via personal communication with tribal members and staff. The seasonal round identifies the historical or traditional premise for the traditional Nez Perce economy. Most of the plants and animals in figure 9 and table 48 are still gathered and used today.

The habitat, soil disturbance and fire response information was provided via personal communication by Jenifer Ferriel, Joan Frazee, and Missy Anderson. Digging and harvest benefits to plants were provided by Nakia Williamson, personal communication.

**Table 48. Traditional plants known to be of interest to the Nez Perce Tribe**

Species	Common or Traditional Name	Habitat	Response to Mechanical Treatment /Soil Disturbance	Fire Response
<i>Apocynum cannabinum</i>	Indian Hemp or Dogbane	Proliferates in open moist margins near riparian areas along streams, springs	Grows in open disturbed areas	Increases plant vigor
<i>Balsamorhiza (sagittata)</i>	Balsam root	Associated with bunchgrass on well drained deep soils, extending into open stands of ponderosa pine and Doug-fir	Increases with overgrazing Likely negative effects	Survives fire because of deep tap root and woody caudex
<i>Calochortus</i> sp.	Mariposa Lily	Grasslands, dry forest	Likely negative effects	Low-Medium tolerance
<i>Camassia quamash</i>	gem'es or Camas lily	Vernally moist meadows and seeps	Increases with aeration with digging/harvesting	Low-Medium tolerance
<i>Claytonia lanceolata</i>	Spring Beauty	widely scattered at mid to high elevations in open moist grassy slopes	Likely negative effects	Early bloomer so less risk by wildfire
<i>Lewisia rediviva</i>	Bitterroot	Grows on well-drained, exposed areas. Most common in grassland communities but occurs in open areas of western shrub, woodland, & forest communities	Likely negative effects	Dormant in summer and early fall so escapes most wildfire. Susceptible to fall fires
<i>Lomatium canbyi</i>	q'eg'iit or biscuit root	Sagebrush steppe, scablands, rocky soils. Seeds into open areas	Light-moderate disturbance can be beneficial; especially from harvest where digging aerates the soil	Mostly fire evader as found in rocky soils. Has deep taproot so is likely to survive low-moderate fires
<i>Lomatium cous</i>	"qaamsit" or cous	Dry open scabby ridges in foothills, low mountainous elevations, lowland flats, scablands	Light-moderate disturbance can be beneficial; especially from harvest where digging aerates the soil	Has deep taproot so is likely to survive low-moderate fires Early blooming so evades most wildfires
<i>Lomatium grayii</i>	Gray's Parsley	Rocky slopes and dry grasslands, common among bunch grasses and sagebrush	Likely negative effects	Mostly fire evader as habitat in rocky soils and

Species	Common or Traditional Name	Habitat	Response to Mechanical Treatment /Soil Disturbance	Fire Response
Prunus virginiana	Chokecherry	Grows at low to mid-elevations in where soil and topography accumulate moisture, i.e. riparian areas, wooded draws, and steep ravines	Negative effects	Re sprouts rapidly and prolifically post fire
Ribes (lacustre)	Currents and goose berries	True fire association. Found in openings in wetter habitats i.e. cool, moist and wet forests. Intolerant found in openings in most habitats Shade intolerant	Grows well in disturbed soils	Likely negative
Taxus brevifolia	Yew	Moist cool to wet, well drained sites beneath closed tree canopies	Sensitive to drastic change to light and temperature; especially after canopy removal	Fire intolerant
Vaccinium sp.	Huckleberry	Moist cool forests at mid to upper elevations, defines true fir site potential in the Blue Mountains	Some disturbance such as thinning is beneficial. Mechanical not beneficial	Low intensity fire benefits berry production

## Scenery

### *Landscape character*

Dominant scenic features of the LJCRP area include open ponderosa pine forests, large, open pine, and larch forests with fall color, grassy forest floors, canyon lands with timbered stringers and basalt rims, basalt and granite rock outcrops, deciduous riparian trees and shrubs, and rustic wooden “ruins” of old homesteads. Table 49 summarizes some of the valued landscape attributes, and special features of the LJCRP area. Ecologically sound landscapes can be aesthetically pleasing as well as sustainable, being reflective of the inherent natural disturbance regimes (including the natural role of fire, insects and

pathogens). Landscape conditions that depart from natural ranges of variation can cause uncharacteristic disturbance severity, which can lead to a dramatic change to the existing scenery.

Vegetation is the primary component that would be affected by management practices considered for the LJCRP. The existing and desired vegetation conditions are described in the “Vegetation and disturbance regimes” section of this Chapter. Landscape variety could be increased by creating a more natural distribution of forest structural and age classes, including natural appearing open spaces.

The landscape variety ranges from the common landscape character type typical of the Wallowa Mountains to unique habitats located throughout the landscape and spectacular scenery viewed along the Lower Joseph Creek Wild and Scenic River.

Restoration objectives to move the landscape toward a more natural range of variability in vegetation structure, composition, and disturbance regimes is consistent with desired conditions for scenic character. Enhancement of large tree viewing opportunities from travel routes, viewpoints, and recreation destinations is also desirable.

Forest Road 46 forms the eastern project boundary, and several other road corridors travel through the project area with numerous viewpoints. The project area is characterized by plateaus and canyons, with Cold Springs Ridge to the northeast, and Elk Mountain to the south. Parts of the LJCRP are visible from the Chief Joseph viewpoint on Oregon Highway 3 north of Enterprise, Oregon.

#### Landscape Scenic Viewsheds

The LJCRP area has been divided into 4 separate landscape areas for assessing scenic effects, including:

Oregon State Highway 3, Joseph Canyon Overlook

Joseph Canyon Wild and Scenic River Corridor

Table Mountain

Forest Road 46, Cold Spring Ridge/Forest Road 4680

**Table 49. Valued landscape attributes of the LJCRP area**

Vegetation type	Valued Landscape Attributes	Special and Distinctive Features
Dry Forest	Ponderosa pine and Douglas-fir, western larch, mallow ninebark, common snowberry	Open park like stands of ponderosa pine and larch, with an understory of grasses. Basalt rock outcrops. Open park-like stands of pine allow filtered light to reach the grassy forest floor to create a unique, open but sheltered experience. This openness provides deep visual penetration into the forest, allowing views of other attributes such as rock outcrops, water features, and framed vistas.

<b>Vegetation type</b>	<b>Valued Landscape Attributes</b>	<b>Special and Distinctive Features</b>
Grasslands	Bluebunch wheatgrass, Idaho fescue, prairie junegrass, elk sedge, boulder field, and sparsely covered forb communities.	Cliffs, talus, steep verticality. The eastside plateau grasslands are contrasted by adjacent pine and Dougals-fir forests. The grasslands allow the contours of the landform to be expressed providing rounded curves and bends to be a part of the scene. Canyon grasslands punctuated by basalt rims and incised by steep drainages, stringers of timber creating dark contrasting lines vertical to the slope, defining the small draws. Riparian vegetation also provides color and shape variation. Slopes are often very steep lending a severity to the landscape.
Moist Forest	Douglas-fir, ponderosa pine, grand fir, western larch and western white pine Engelmann spruce, lodgepole pine and subalpine fir, Pacific yew, Rocky Mountain maple, serviceberry, and a large variety of other shrub species.	Deep shade, and heavy vegetation.
Riparian herblands and shrublands	Black cottonwood quaking aspen, ninebark, oceanspray, rocky mountain maple, and willows.	Linear stringers of deciduous trees and shrubs amidst grass slopes. The eastside riparian shrublands are very brushy, providing variety in form as well as fall color. These habitats are often surrounded by grassy midslope and/or coniferous forest, which provide visual diversity in color and form. The deciduous vegetation provides a ribbon of fall color amidst the surrounding coniferous forest or grasslands.

### *Oregon State Highway 3, Joseph Canyon Overlook*

Joseph Viewpoint located on State Highway 3, is designated as a Level 1 (critical) viewshed within the WWNF and over 76,000 visitors stop at the site annually.

### *Joseph Canyon Wild and Scenic River Corridor*

Joseph Creek is classified as a Wild River from one mile downstream from Cougar Creek (Joseph Creek Ranch) to the WWNF boundary, for a total of 8.6 miles. Joseph Creek's outstandingly remarkable values include scenery, recreation, geology, fish, wildlife and history. The spectacular natural setting, ruggedness, inaccessibility and steep topography of Joseph Creek and the surrounding environs of Joseph Canyon create a lasting impression on those who view it. The river corridor provides a spectacular example of the steep, rimrock-exposed canyons found in northeast Oregon.

Access to Joseph Canyon and Joseph Creek is limited due to remoteness, steep and rugged terrain and climatic conditions. Hiking, horsepacking, birdwatching, wildlife viewing, fishing and big game hunting can be enjoyed in a solitary manner. The canyon contains examples of northeast Oregon geology, with Columbia River basalt canyons exposed by downcutting of rivers. The 2,000 foot deep canyon is virtually unmodified and its spectacular details, such as steep sideslopes, basalt layers and dikes, can be easily viewed from the canyon rim. Joseph Creek is an important wild steelhead and wild rainbow trout fishery. Wildlife includes bighorn sheep, deer, elk, bear, river otter and cougar. The area plays a vital role in Nez Perce Tribal history. Most important is the proximity of the river corridor to the winter gathering place for Chief Joseph and his band at the mouth of Joseph Creek.

*Table Mountain*

Table Mountain accessed by Forest Service Road 4650, provides scenic viewpoints south and west across grassy hillsides and forested stringers into Joseph Canyon and the Joseph Creek Wild and Scenic River, and has been identified as an important place to view scenery by local residents.

*Forest Road 46, Cold Spring Ridge/Forest Road 4680*

Red Hill Lookout is located on Forest Road 46 and straddles the hydrologic divide between Upper and Lower Joseph Creek Watershed, and about 2,300 people visit the viewpoint each year. Cold Spring Ridge forms the northeastern boundary of the project area, within the Hells Canyon National recreation area (HCNRA) between the Cook Ridge and Wildhorse Inventoried Roadless areas.

*Scenic integrity*

Scenic integrity is the amount of human caused deviation in form, line, color, and texture of a landscape. Scenic integrity serves as a frame of reference for measuring scenic integrity levels based on the valued attributes of the existing landscape character being viewed. The degrees of integrity vary from very high to very low. Scenic Integrity is measured on the Wallowa-Whitman National Forest through Visual Quality Objective levels defined by the USFS Visual Management System's Chapter 1 USDA Handbook # 462. Table 50 summarizes the proportion of the LJCRP area in each of the four scenic integrity levels found in the project area (very high to low). The current landscape character is predominately a naturally appearing to slightly altered forested environment viewed in the foreground, middleground and background of viewsheds. The existing scenic integrity of the LJCRP meets the visual quality objective of the Forest Plan and has a range of scenic integrity levels from very high to low. Within the project area there are evidences of past activities. Partial removal treatments can be seen in partial retention areas, and stumps are apparent. Along with the evidences of treatments are the indirect effects of additional variety in color and texture as deciduous shrubs and larch species have begun to take hold. Areas of retention visual quality objective are intact. The scenic integrity levels meet the Forest Plan Standards and Guidelines for a natural appearing foreground and middleground from the designated travel routes and viewsheds and areas of natural appearing to slightly altered in some middleground and background areas.

**Table 50. The proportion of the LJCRP area in each of four scenic integrity classes found in the LJCRP**

Scenic integrity level	Visual quality objective	Condition and allowed management effects	Acres	% of project area
Very high	Preservation	Unaltered. Allows ecological changes only	2,371	2
High	Retention	Appears unaltered. Management activities are not visually evident.	7,494	8
Moderate	Partial retention	Slightly altered. Management activities remain visually subordinate to the characteristic landscape.	52,996	54
Low	Modification	Moderately altered. Management activities may dominate landscape, but must borrow from naturally established form, line, color, or texture.	35,717	36
		Total	98,578	100

*Scenic stability*

Scenic stability levels are defined in Table 51. The greatest hazard to scenery resources in this area are large stand replacement fires that would burn much more intensely due to the stocking levels, species compositions, ladder fuels and canopy closure that have developed over time, and large epidemics of

insect or disease. Table 4 summarizes existing and desired fire severity probabilities for the dry and moist upland forest potential vegetation groups. Fire severity can be classified into three classes: replacement, moderate (mixed), and low. A fire with a replacement severity generally means that more than 75% of the dominant overstory vegetation is killed by the fire. Moderate or mixed severity fires are generally low-severity fires replacing less than 25% of the dominant overstory vegetation, but can include mixed-severity fires that replace up to 75% of the overstory. Low severity fires generally kill less than 25% of the dominant overstory.

**Table 51. Definitions of scenic stability levels**

Level	Definition
Very High Stability	All dominant and minor scenery attributes of the valued scenic character are present and are likely to be sustained.
High Stability	All dominant scenery attributes of the valued scenic character are present and are likely to be sustained. However, there may be scenery attribute conditions and ecosystem stressors that present a low risk to the sustainability of the dominant scenery attributes.
Moderate Stability	Most dominant scenery attributes of the valued scenic character are present and are likely to be sustained. A few may have been lost or are in serious decline.
Low Stability	Some dominant scenery attributes of the valued scenic character are present and are likely to be sustained. Known scenery attribute conditions and ecosystem stressors may seriously threaten or have already eliminated the others.
Very Low Stability	Most dominant scenery attributes of the valued scenic character are seriously threatened or absent due to their conditions and ecosystem stressors and are not likely to be sustained. The few that remain may be moderately threatened but are likely to be sustained.
No Stability	All dominant scenery attributes of the valued scenic character are absent or seriously threatened by their conditions and ecosystem stressors. None are likely to be sustained, except relatively permanent attributes such as landforms.

In dry upland forests, existing fire regimes are more dominated by mixed severity fires than is characteristic of this type (13-21% of fires are characteristically mixed severity, compared to 49% today). Dry forest fire regimes in the LJCRP area are less dominated by low severity fires than is characteristic of this type (64-82% of fires are characteristically low severity). Low severity fires that generally dominated dry forest fire regimes created the landscapes that are highly valued – open, park like stands of large ponderosa pine and western larch. Dry forest areas with higher levels of mixed severity than the RV are of moderate to low scenic stability since, when these places burn, they will include up to 25% in patches that are completely killed, including large trees of high scenic attractiveness and value.

In moist upland forests of the LJCRP area, fire suppression has reduced the number of replacement severity fires compared to the RV (14-35% of fires are characteristically of replacement severity, compared to 3% today). This condition also has moderate to low scenic stability. Naturally, replacement fires in moist forests served to create horizontal forest heterogeneity. Fire suppression has caused forest densification and increased horizontal homogeneity; hence, when a stand replacement fire escapes fire suppression, they are generally larger and more severe. Grasslands of the LJCRP area generally burned historically with replacement severity, and still do, although high levels of domestic livestock grazing in some areas have reduced fire extent and frequency relative to historical levels.

### *Landscape visibility*

Landscape visibility for scenic analyses is categorized into three classes: foreground, middleground, and background. Foreground is based on landscape visibility and is defined as views up to ½ mile distance zone, middleground is ½ mile to 4 miles distance zone and background is 4 miles to the horizon from the

travelway and use areas. Additional information and descriptions regarding Visual Quality Objectives (VQO's) may be found in the Forest Service Scenery Management System (USDA Forest Service, 1995) and the Visual Management System (USDA Forest Service 1974) National Forest Landscape Management Handbooks. Table 52 summarizes the proportion of the LJCRP in each landscape visibility class.

**Table 52. Proportion of the Lower Joseph Creek Restoration Project in each landscape visibility class**

Visibility class	Acres	%
Foreground	11,049	11
Middleground	21,999	22
Background	413	<1
Other	65,116	66
Total	98,578	100

## Recreation

The recreation activities within the LJCRP project area are predominately dispersed in nature, however, developed sites, trail use and special use permitted activities occur within the project area. There are 5 developed recreation sites including Coyote and Dougherty campgrounds, the Kirkland Cabin, the Joseph Canyon Viewpoint and the Frog Pond and Chico Trailheads. Other recreation activities are focused on day use activities such as OHV use, hunting, firewood gathering, mushroom picking, and viewing scenery. The highest use in this area occurs during the big game hunting seasons when hunters occupy many of the dispersed campsites within the area.

Because the construction of new recreation facilities or reconstruction of existing recreation facilities is not proposed for the LJCRP, this document focuses on the harvest activities and fuel treatments and their effect on the recreation setting and visitor opportunities.

The analysis area is the project area as described in Chapter 1 of this EIS. This analysis area is characterized by a diverse range of habitats. Northern aspects and higher elevations consist of mixed conifer types, ridge tops and southern aspects transition into ponderosa pine, Douglas-fir, and dry grand fir types.

The 1990 forest plan uses the recreation opportunity spectrum (ROS) framework for stratifying and defining classes of outdoor recreation environments, activities and experience opportunities. There are seven ROS classes arranged along a continuum from primitive to urban. The LJCRP lies within the ROS class Roaded Natural, semi-Primitive Non-Motorized, and a small amount of Semi-Primitive Motorized.

Other forest plan recreation standards and guidelines that apply to the proposed activities in LJCRP include recreation site development; outfitter/guide services; special places such water features, rock or unique landform features, historic sites, etc.; and road, trail and area motor vehicle use in accordance with the forest travel management plan (see Appendix B).

## *Existing Condition*

Although no specific recreation use studies were completed for the LJCRP, inferences can be made to the typical types of activities that occur in the project area based on a national recreation survey. In 2008 the

WWNF conducted the National Visitor Use Monitoring (NVUM) (WWNF, 2009) survey to gather information about recreation visitor satisfaction, activities and use levels. One product of the survey revealed the primary and overall participation levels for various activities.

**Table 53. Participation in the top 10 recreational activities on the WWNF**

Top activities on the WWNF	Percent of visitors who participated in this activity	Percent of visitors who participated in this as primary activity
Viewing natural features	49.9%	13.3%
Viewing wildlife	46.8%	3.5%
Hiking and walking	46.5%	15.3%
Relaxing	39.4%	5.7%
Driving for pleasure	30.0%	11.2%
Fishing	24.7%	13.2%
Visiting historic sites	17.0%	0.5%
Picnicking	15.7%	1.4%
Developed Camping	13.4%	1.9%
Backpacking	12.9%	6.6%

Some of the activities with low participation on the WWNF (Table 53) are: Off-Highway Vehicle (OHV) use (2.6%), bicycling (1.5%), horseback riding (1.8%), and snowmobiling (0.8%). The highest percent of survey respondents were from Baker County, OR (8.8%), Union County, OR (7.1 %), Foreign Countries (2.5%), Nez Perce County, ID (2.5%), Wallowa County, OR (2.0%), and other counties in and around the WWNF in Idaho, Oregon, and Washington. During their time on the forest, visitors spent an average 2.0 hours at developed recreation sites, 44.3 hours at overnight sites, and 27.3 hours in undesignated areas.

### Dispersed Recreation

Visitors participating in dispersed recreation activities do not primarily use or rely upon developed sites such as campgrounds, or picnic areas. However they may use a developed site to support their activity, such as parking at a trailhead, but their main time is spent away from the developed sites. All of the activities listed in Table 53 (except developed camping) could be viewed as dispersed recreation activities. Other activities may include hunting, OHV use, snowmobiling, horseback riding, and cross country skiing. Visitation for these dispersed activities in areas known as ‘general forest areas’ (non-wilderness areas) account for over 54% of the total Forest visits according to the NVUM survey (WWNF, 2009).

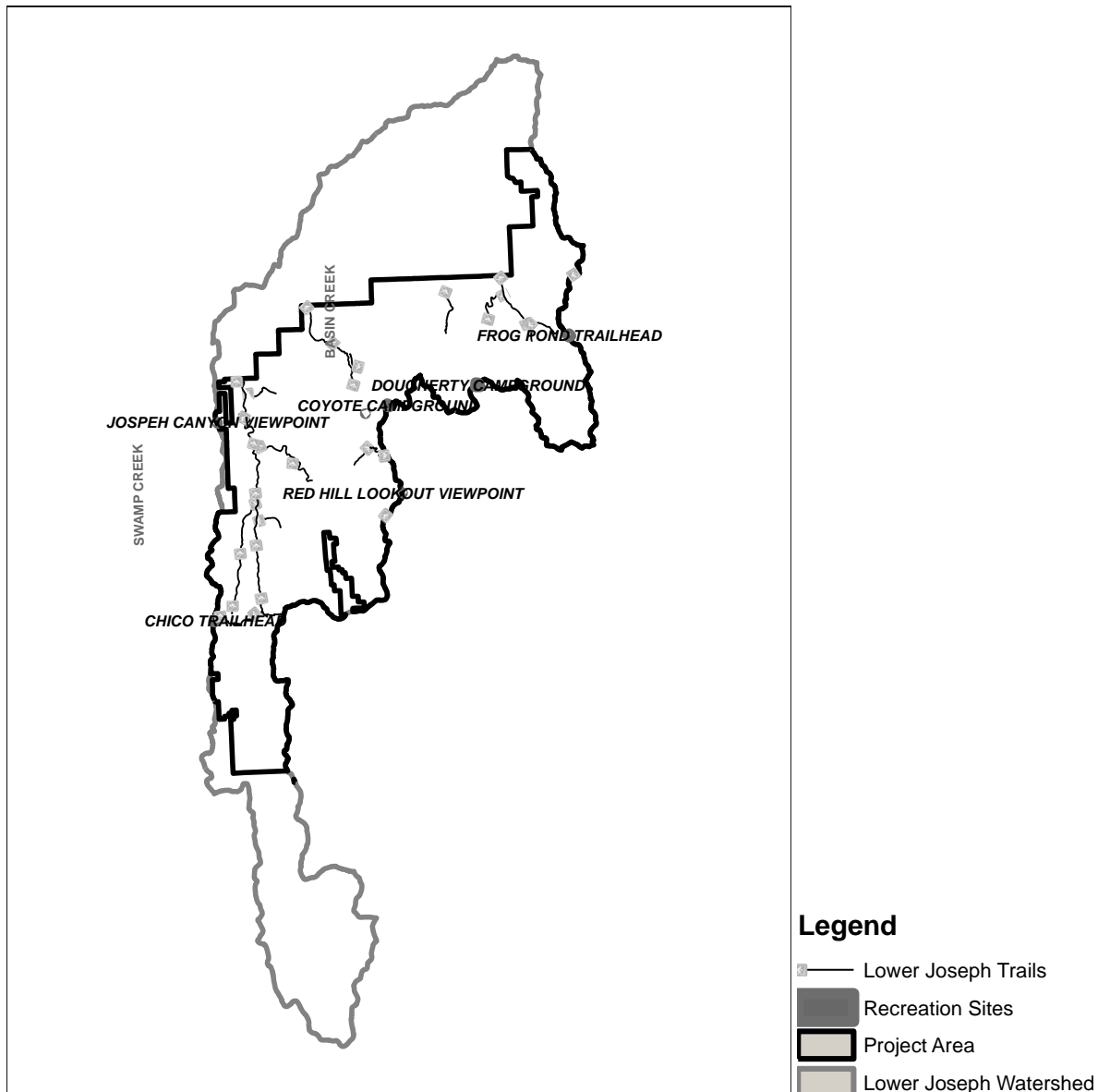
Dispersed camping is a popular activity for overnight users who do not camp in a developed campground. There are numerous dispersed camping opportunities in LJCRP. These campsites receive low to moderate use beginning in late spring with the majority of sites showing heaviest use during the fall hunting season. Many of these campsites have been used for decades with some sites showing soil compaction and a loss of vegetation.

As shown in Table 53, other types of dispersed recreation occur year-round. Visitors enjoying these recreational pursuits may use forest roads as transportation networks (i.e. OHV riders, snowmobile riders, cross-country skiers, driving for pleasure, viewing wildlife), or just travel cross-country away from roads and trails (i.e. hunters, viewing nature, fishing, hiking or walking).

Currently OHV use can occur both on designated open roads, closed roads, trails and in many cross-country locations in LJCRP. Overall motor-vehicle use in the area is light yet it does increase during the big-game hunting season.

### Developed Recreation Sites and Trails

In addition to the two campgrounds, the Joseph Canyon Viewpoint, Kirkland Cabin, and the two designated trailheads, there are approximately 50 miles of designated trails (Figure 10) which are not part of the motorized road network. Also, the Red Hill lookout straddles the hydrologic divide between the Upper and Lower Joseph Creek Watersheds. Overall use of these facilities is low except during fall hunting season when it may be used at a moderate level. The exception amongst these sites is the Joseph Canyon Viewpoint, which experiences high use throughout the year.



**Figure 10. Developed recreation within the LJCRP area.**

### Permitted Uses

Some recreational activities are managed under permits which allow recreationists or operators to do certain activities under the terms of the permits. These permits include; gathering firewood, gathering

forest products like mushrooms, hunting and recreation special use activities. Use of these permits can be considered ‘recreational’ since visitors often participate in them for primary or secondary forms of enjoyment.

Annually the WWNF sells over 2,500 of personal use firewood permits and over 1,900 forest product permits like mushroom and Christmas tree tags. Each permit has terms and conditions which guide uses and locations for the activities. Although no data is available for how many permits are used in the LJCRP, these activities can generally occur in most areas outside of riparian areas, old growth management areas, tree plantations, and other special designated location described on the permits.

Outfitter guides that operate in the LJCRP area consist of one big-game outfitter with a base camp and operations occurring from a private lodge, and two cougar and bear hunting guides (USFS, 2011). There is a current mountain bike outfitter permit; however, the permit has not been used for at least three years. Each operation is authorized by a special use permit, which states the annual operating plan and requirements of the permittees. Management involves preparation of an annual operating plan and field inspections of the base camp.

The LJCRP area lies within the Chesnimus and Sled Springs Big Game Management Units. The area is popular during big game and bow and rifle seasons in late summer and fall, and bear and turkey hunting in the late fall and early spring. ODFW will continue to offer hunting opportunities in this area as part of their management of big game. Within this project area there is the Chesnimus Cooperative Travel Management Area. This is a joint agreement between the WWNF and the ODFW where there are identified seasonal road closures. The closures are in effect 3 days prior to the rifle bull elk season through the end of the rifle bull season (approximately 10/25 – 11/27). The objectives of this closure are to protect soils and wildlife habitat, minimize harassment of wildlife, maintain adequate bull escapement, and promote quality hunting.

## **Potential Wilderness Areas, Inventoried Roadless Area and other Undeveloped Lands**

This section incorporates by reference the LJCRP Wilderness, Inventoried Roadless Area, and Potential Wilderness Area Report contained in the project record. This section summarizes the affected environment and environmental consequences for the Joseph Canyon, Wildhorse, and Cook Ridge Inventoried Roadless Areas (IRA), Joseph and Wildhorse Potential Wilderness Areas (PWA), other remaining undeveloped lands, and environmental organizations unroaded areas. These topics are grouped and discussed together because they share terminology and interrelated history. The PWA/IRA/Wilderness report found in the project record discloses additional narrative and maps in support of this topic.

## **Scope of Analysis**

The scope of analysis includes the LJCRP area, Joseph Canyon, Wildhorse and Cook Ridge IRAs, Joseph and Wildhorse PWAs, and lands immediately adjacent to the project boundary such that reasonable analysis could be completed in identifying areas with wilderness potential. There is no designated wilderness within or adjacent to the project area, so there would be no direct, indirect, or cumulative effect of the proposed activities on wilderness. Therefore, effects to designated wilderness will not be discussed further.

## **Wilderness**

Wilderness evaluation and wilderness recommendations are a forest planning issue and outside the scope of this site specific analysis and decision. Only congress has the statutory authority to designate wilderness. It is within the authority of Congress to designate wilderness areas that do not meet the potential wilderness inventory criteria. Areas recommended to Congress for wilderness study or

designation are those areas identified on the potential wilderness inventory and evaluated for wilderness suitability for potential addition to the National Wilderness Preservation System by forests during the Land Management Planning process using wilderness inventory criteria, outlined in Forest Service Handbook 1909.12, Chapter 71.

### *Inventoried Roadless Area*

The 2001 Roadless Area Conservation Rule (RACR) sets forth particular requirements when timber may be cut, sold, or removed within Inventoried Roadless Areas. Following are the requirements which apply to this project and will be used as indicators of compliance with the RACR. They are further explained below.

- The purpose is to maintain or restore the characteristics of ecosystem composition or structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period. *36 CFR 294.13 (b)(1)(ii)*.
- The timber is generally small diameter. *36 CFR 294.13 (b)(1)*.
- Timber cutting, sale, and/or removal are needed to maintain or improve one or more of the roadless area characteristics. *36 CFR 294.13 (b)(1)*.
- The cutting, sale, or removal of timber is incidental to the implementation of a management activity not otherwise prohibited. *36 CFR 294.13 (b)(2)*. This criterion will only be applied to cutting and removal of roadside danger trees.
- The cutting and sale of timber is expected to be infrequent. *36 CFR 294.13 (b)*.

These criteria only apply to the management within IRAs.

Acres of forest treated within Inventoried Roadless Areas will be used to track the extent of the effects.

Alternative 2 is the only action alternative that proposes the cutting, sale, or removal of timber within IRAs. There would be no temporary roads constructed. The existing system roads will be used to facilitate yarding and haul. Therefore, no criterion is needed to address this concern.

### **Maintaining or Restoring the Characteristics of Ecosystem Structure**

The specific purpose for treatment of IRAs in this project is: “To maintain or restore the characteristics of ecosystem composition or structure, such as to reduce the risk of uncharacteristic wildfire effects, within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period.” The current condition of the project area in Chapter 1 applies to the IRAs identified for treatment activities. Fire suppression outside and within the IRAs have resulted in increased density of younger fire intolerant species (such as grand fir) and an associated increase in fuel loading and in particular an increase in ladder fuels. Old fire resistant trees are likely to continue to decline in many of the dry and mixed conifer stands found in these IRAs due to increased competition especially during times of extended or early onset drought. These structure, density, composition, and disturbance regime changes increase the potential risk for uncharacteristic wildfire or insect/disease mortality with increased severity and effect on the integrity of the IRAs.

### **Maintaining or Improving Roadless Area Characteristics**

Uncharacteristic disturbance due to changes in structure, density, composition, and pattern could adversely affect roadless area characteristics of the Joseph Canyon, Cook Ridge, and Wildhorse IRAs. Roadless area characteristics are resources or features that are often present in and characterize inventoried roadless areas, including;

1. High quality or undisturbed soil, water, and air;
2. Sources of public drinking water;
3. Diversity of plant and animal communities;
4. Habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land;
5. Primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation;
6. Reference landscapes;
7. Natural appearing landscapes with high scenic quality;
8. Traditional cultural properties and sacred sites; and
9. Other locally identified unique characteristics.

### **Generally Small Diameter**

The RACR did not specifically define what constitutes “generally small diameter timber,” “(b)ecause of the great variation in stand characteristics between vegetation types in different areas...” The Rule further states that project planning:

[W]ill consider how the cutting or removal of various size classes of trees would affect the potential for future development of the stand, and the characteristics and interrelationships of plant and animal communities associated with the site and overall landscape. Site productivity, due to factors such as moisture and elevation gradients, site aspect, and soil types, will be considered, as well as how such cutting or removal of various size classes of standing or down timber would mimic the role and legacies of natural disturbance regimes in providing habitat patches, connectivity, and structural diversity critical to maintaining biological diversity. In all cases, the cutting, sale, or removal of small diameter timber will be consistent with maintaining or improving one or more of the roadless area characteristics (see Final Rule, Federal Register, Volume 66, No.9, 3257).

Stand data will be collected in September for a sample of stands within IRAs to model the existing quadratic mean diameter (QMD) in comparison to post-treatment QMD. If the QMD for proposed treatments in each IRA increases as a result of treatment, this may illustrate that the treatments’ net effect is to shift the landscape toward the HRV, increasing the average stand diameter, and reducing the overabundance of stands with smaller average diameters. This will determine and indicate that the treatments meet the criteria of removing small diameter trees.

### **Cutting, Sale, or Removal of Danger Trees is Incidental**

Cutting danger trees along roads can be necessary to remove trees with pose a danger to travelers. Danger trees are identified using the Field Guide for Danger Tree Identification and Response (USDA Forest Service Region 6 and USDI Bureau of Land Management). The primary objective of this activity would be incidental to maintaining a road for safe travel. This criterion applies only to the activity that removes danger trees. Other criteria used for other prescriptions (e.g., generally small diameter) does not apply to danger tree mitigation.

### **Description of Joseph Canyon, Wildhorse, and Cook Ridge IRA**

During the current Forest Plan Revision Process each of these IRAs were analyzed for meeting potential wilderness criteria and detailed descriptions were made for each concerning their existing resource conditions. Further description for the Joseph Canyon, Wildhorse, and Cook Ridge IRAs are found in

Appendix C of the FEIS for the Wallowa Whitman Land and Resource Management Plan. Wildhorse and Cook Ridge IRAs described in the Hells Canyon National Recreation Area Comprehensive Management Plan. These documents are incorporated by reference and are included in the project record. Below is a brief summary of the contents as it pertains to the cutting, sale, or removal of timber and the projects goal to maintain or restore ecological structure and natural disturbance for each of these IRAs.

#### Joseph Canyon IRA (24,288 acres)

The Joseph Canyon Roadless Area lies adjacent to State Highway 3 on the northern boundary of the Forest, 20 miles north of Enterprise, Oregon. In addition to evidence of timber harvest, there are scattered examples of human activity. These include abandoned fields and remains of buildings within the isolated private land parcels along Joseph Creek. Old railroad grades and skid trails in the lower reaches of Davis and Swamp Creeks were the result of logging activities from 1920s and '30s. About 50 livestock watering facilities, 30 miles of fence, and 6 miles of jeep road are found within the area. Recurring surface fires of low-to-moderate intensity and endemic insect and disease episodes controlled species composition, maintained sustainable stocking levels, and favored the retention of the intolerant conifers such as ponderosa pine. The absence of fire over the last 100 years (prior to 1986) resulted in the widespread development of dense forest dominated by sapling to small-sized, late seral Douglas-fir. The probability of a stand replacement event exceeding historic patterns, whether by fire, insects, or pathogens, was quite high due to the predominance of continuous layered, late seral structures. These expected consequences were realized during the Joseph Canyon Fire of 1986. Most of the timbered stringers (approximately 75 percent) were converted to the stem initiation stage of stand development. Salvaged stands were either seeded aerially or planted with conifer seedlings. Sites are marginally stocked with ponderosa pine and Douglas-fir seedlings and saplings.

#### Cook Ridge IRA (19,617 acres)

The Cook Ridge Roadless Area is entirely within the Hells Canyon National Recreation Area. Much of the Hells Canyon National Recreation Area is in a roadless and undeveloped condition. The Cook Ridge Roadless Area is located primarily in Township 4 North, Range 48 East northwest of Buckhorn Springs. It abuts the Mountain Sheep Roadless Area to the north and east, Cold Springs Ridge to the west, and the Wallowa Valley Ranger District to the south. The area is dominated by Cook Creek which bisects the roadless area, south to north. The entire roadless area was impacted by the 1988 Teepee Butte Fire. The effects of the fire varied according to differences in fire intensity, duration, and pre-fire vegetative composition. Primarily, the intensely burned portions of the area occurred on the steep breaklands and within the dense thin-barked, grand fir-dominated stands on the upper plateau. Approximately 700 acres of the severely burned upper plateau was replanted with Douglas-fir, ponderosa pine, and western larch in 1992. Regenerated stands are currently fully stocked with conifers averaging four to six feet in height. The unplanted and non-harvested land base capable of supporting conifers will require decades to restock with conifers given the loss of potential seed source and the relative harshness of the exposed sites. The IRA was also impacted by the Cache Creek fire of 2012, which burned 5,780 acres.

#### Wildhorse IRA (20,308 acres)

The Wildhorse Roadless Area is bounded by the Cook Ridge Roadless area to the east and by the Wallowa Valley Ranger District to the west and south. The national forest boundary delineates the northern extent. The Dispersed Recreation/Timber Management portion of the roadless area was salvage-harvested following the Teepee Butte Fire of 1988. Substantial volume was removed via approximately 4 miles of permanent road which was constructed to facilitate harvest on the upper plateaus. Approximately 1,700 acres of the upper plateau were replanted with Douglas-fir, ponderosa pine, and western larch in 1992. Regenerated stands are currently stocked with conifers averaging 4-6 feet in height. The unplanted and non-harvested landbase capable of supporting conifers will require decades to re-stock with conifers given the loss of potential seed source and the relative harshness of the exposed sites. Previous high-

intensity fires altered the landscape. Prior to the fire, logging had been limited to light salvage entries and restricted to ground-based equipment within the Dispersed Timber Recreation Management land allocation within the HCNRA. Following the Teepee Butte Fire, salvageable timber in excess of 12-inch DBH was removed from the upper flats of Cook Creek. About 4 miles of permanent road and 1 mile of temporary road was constructed to facilitate salvage harvest within both the Cook Ridge and Wildhorse Roadless Areas.

Table 54 indicates the number of acres for each of the IRAs located within and outside of the project boundary. No changes were made to these boundaries. All three of these inventoried roadless areas will be considered in this analysis including the portion of the Cook Ridge IRA that is within the project boundary.

**Table 54: Size of Inventoried Roadless Areas, and portions within the LJCRP boundary**

IRA Name	Total acres	Acres in project boundary
Joseph Canyon	24,288	24,225
Wildhorse	20,308	20,282
Cook Ridge	19,617	544

As a result of past management activities some portions of the IRAs may now have forest roads, stumps, skid trails, roads that are substantially recognizable, have acres where salvage or harvest have not regenerated to the degree that canopy closure is similar to surrounding areas. Under this situation these areas would not meet PWA inventory criteria (FSH 1909.12 Chapter 71). Approximately 17,805 acres of the Joseph Canyon IRA, 4,899 acres of the Wildhorse IRA, and the 544 acres of Cook Ridge IRA within the project boundary did not meet PWA criteria because past logging was evident and these acres had recognizable stumps, contained forest roads, were within 300 feet of a forest road, or were adjusted under the Boundary Adjustment Guidelines found at FSH 1909.12 Chapter 70(72.5).

### *Potential Wilderness Areas*

The Forest Service Land Management Planning Handbook Chapter 70 (FSH 1909.12(70)) describes the criteria for evaluating Potential Wilderness Areas (PWA). Basically, the area must be 5,000 acres or greater or contiguous to an existing wilderness area, or potential wilderness area in other Federal ownership and are absent of features that are substantially recognizable and would detract from the wilderness characteristics of the area as identified in FSH 1909.12(70). For this analysis, areas containing system roads (including 300 feet on either side) and past harvest (1970 – present) were removed from consideration for Potential Wilderness (see Appendix I for an illustration of the analysis process). Two PWAs were identified, based on GIS mapping, as being potentially affected by actions proposed in this project.

The following indicator quantifies and tracks this issue:

- Acres within Potential Wilderness Area which could continue to qualify under FSH 1909.12 Chapter 70.

There are two PWAs (Joseph and Wildhorse) within the project area. There is a large overlap of PWA acres with IRA so effects to both will be discussed similarly. Total PWA acres include all areas meeting PWA evaluation criteria including some portions of the Joseph Canyon and Wildhorse IRA in addition to adjacent land outside of IRA boundaries.

*Other Undeveloped Land*

Indicators of comparison between the alternatives are as follows.

- Intrinsic physical and biological resources (soils, water, wildlife, recreation, fisheries, etc)
- Intrinsic social values (apparent naturalness, solitude, remoteness)
- Change in acres of other undeveloped lands
- Change in size class of other undeveloped lands

The process used to identify other undeveloped lands is described in the PWA/IRA/Wilderness report located in the project record. Approximately 40,919 acres (about 41 percent) of the project area have been identified as isolated polygons of other undeveloped lands. A portion of these acres are within IRA boundaries but did not meet PWA evaluation criteria found in FSH 1909.12 Ch. 71. Table 55 shows the size class distribution for other undeveloped lands in the project planning area. Managing planned (prescribed fire) and unplanned ignitions is an important part of the overall restoration of landscape resiliency therefore the acre affects from fire is consistent between alternatives. Only the high priority areas (areas that receive a form of mechanical or hand treatment or areas within dry upland forest) are included in the acre calculation.

**Table 55. Size class distribution of other undeveloped lands in the project area.**

Number of Polygons	Size Class	Approximate Acres
253	1 to 99 acres	3,826
30	100 to 499 acres	5,747
7	500 to 999 acres	5,249
11	1,000 to 4,999 acres	26,097
0	5,000+ acres	0
301	<b>Total</b>	40,919

Human influences have had an impact on long-term ecological processes within the other undeveloped lands particularly through the use of grazing and wildfire suppression. These social uses and concerns will likely continue in the near term with a potential to increase the severity of disturbance by insect, disease, or wildfire. Opportunities for primitive recreation are generally characterized by hiking (cross-country and some trail), hunting and off trail horseback riding. Ongoing firewood gathering and removal of danger trees along forest roads that border these areas changes the vegetation, creates stumps, and presents a managed appearance within the developed transportation corridor.

*Consideration of Areas Identified as Unroaded by Environmental Organizations*

In addition to the areas identified above as meeting Forest Service Criteria for Potential Wilderness Areas, there are five areas identified by environmental organizations as unroaded that are “rare on the landscape” and have had limited human influence. The organizations further state that these areas could provide the ecological building blocks for restoration of natural disturbance processes such as fire. These areas do not, in their entirety, meet the Forest Service’s criteria as potential wilderness as identified in FSH 1909.12 CH. 70 and the Boundary Adjustment Guidelines found at FSH 1909.12 Chapter 71 (72.5).

The following indicator will be used to track this issue:

- Acres of treatment within areas identified as unroaded by environmental organizations

Consideration of these areas will be shown in the project record with maps and tables indicating overlap with Forest Service identified PWA, IRA, and proposed treatments and the environmental consequences in terms of acres from those treatments. Table 56 characterizes these areas and Table 57 shows the acres affected by the action alternatives (there will be no effect due to the no-action alternative so it will not be included in this table). Managing planned (prescribed fire) and unplanned ignitions is an important part of the overall restoration of disturbance throughout this landscape therefore the affect from fire is consistent between alternatives. Only the high priority areas (areas that receive a form of mechanical or hand treatment or areas within dry upland forest) are included in the acre calculation.

There are approximately 33 miles of system road included within the area identified by environmental organizations.

**Table 56. Characterization of environmental organizations unroaded area**

<b>Environmental Organizations Unroaded Area Name</b>	<b>Total acres included in Environmental Organizations Unroaded Area</b>	<b>Acres in project boundary</b>	<b>Acres in Forest Service IRA</b>	<b>Acres in Forest Service PWA</b>
Joseph Canyon	40,222	38,902	24,034 (Joseph Canyon IRA)	6,440 (Joseph PWA)
Cottonwood Creek – Broady Creek	24,482	23,991	20,085 (Wildhorse IRA)	15,396 (Wildhorse PWA)
Sumac Creek	1,729	1,717	0	
Yew Wood Springs	1,394	1,394	0	
Boner Gulch	1,378	1,352	0	
<b>Total</b>	<b>69,205</b>	<b>67,356</b>	<b>44,119</b>	<b>21,836</b>

**Table 57. Characterization of acres of treatment within environmental organizations unroaded areas by action alternative.**

<b>Environmental Organizations Unroaded Area Name</b>	<b>Total acres included in Environmental Organizations Unroaded Area</b>	<b>Proposed Action</b>			<b>Alternative 3</b>	
		<b>Harvest</b>	<b>Stand improvement</b>	<b>Prescribed Fire (High)</b>	<b>Harvest</b>	<b>Stand improvement</b>
Joseph Canyon	40,222	4,906	835	17,579	2,846	628
Cottonwood Creek – Broady Creek	24,482	3,334	2,242	11,874	335	43
Sumac Creek	1,729	178	0	520	86	0
Yew Wood Springs	1,394	699	1	983	659	1
Boner Gulch	1,378	224	0	401	173	0

## Research Natural Areas

Research Natural Areas (RNA) are designated for research and educational opportunities, to maintain biological diversity on National Forest land, and are selected to complete a national network of ecological areas. Establishment of research natural areas has been sanctioned in the Code of Federal Regulations in Section 7 CFR 2.42, 36 CFR 251.23, and 36 CFR 219.25. Direction for establishment is provided in Forest Service Manual 4063 and in “A Guide for Developing Natural Area Management and Monitoring

Plans” written by the Pacific Northwest Interagency Natural Area Committee. As stated in this guide, each RNA is designated based on three major objectives: 1) To preserve examples of all significant natural ecosystems for comparison with those areas influenced by humans; 2) to provide educational and research areas for ecological and environmental studies and monitoring; and 3) to preserve gene pools for typical and rare and endangered plants and animals.

Horse Pasture Ridge and Haystack Rock were originally proposed for RNA designation in 1988. Horse Pasture Ridge proposed RNA is on the WWNF, northeast of Enterprise, Oregon (T5N R45E section 28, Willamette Meridian). Haystack Rock is also northeast of Enterprise, Oregon (T4N R45E primarily in sections 8 and 17 with small portions found in sections 7 and 18, Willamette Meridian). The Horse Pasture Ridge proposed area will contribute to the national network of RNAs by providing an example of Idaho fescue-prairie junegrass and Idaho fescue –bluebunch wheatgrass plant associations in ridge top communities. The Haystack Rock proposed area will contribute to the national network of RNAs by providing an example of Idaho fescue-bluebunch wheatgrass-arrowleaf balsamroot and bluebunch wheatgrass-Sandberg’s bluegrass-narrow-leaved skullcap plant associations. Horse Pasture Ridge and Haystack Rock proposed RNAs would therefore preserve examples of a significant natural ecosystem, would preserve gene pools for these community types, and provide an educational and research area for study of these unique ecosystems.

There are no known significant mineral resources within the area. Recreation use is light, consists of big game hunting, and is expected to continue. Loss of timber utilization is minimal because the area contains few trees. Grazing is incidental to none since they are located on the steep rocky slopes above Joseph Canyon. There are no threatened or endangered plants or animals known in the area, and there are no system roads or trails nor a need for system roads or trails in either proposed RNA.

## Transportation

Roads analysis assesses the current forest transportation system and identifies issues and assesses benefits, problems and risks to inform the decisions related to the administration of the forest transportation system and helps to identify proposals for changes to the transportation system as it relates to the WWNF forest plan.

The design of this analysis is based on the methodology used in the publication Roads Analysis: Informing Decisions About Managing the National Forest Transportation System (USDA Forest Service 1999).

The WWNF forest plan and the CMP for the HCNRA describes management areas related to resource issues. For certain management areas, there are road densities described as standards and guidelines to address certain resource concerns (see wildlife section describing road densities relative to elk habitat, above). In addition, the Biological Opinion on the WWNF LRMP for Snake River Salmon and Steelhead (1998) described a 2 mile/square mile road density as a term and condition for 5<sup>th</sup> field HUCs to limit the potential impact on listed fish and their habitat.

### *Transportation System for LJCRP Area*

The LJCRP Area contains 406 miles of existing NFS roads. Currently there are 127 miles of road open to motorized vehicles year-round. There are 10 miles of road closed to motorized vehicles from 8/28 to 11/28 (seasonally closed) and 101 miles closed to motorized vehicles from 10/25 to 11/27 (seasonally closed). There are 128 miles of road closed year around to all motorized vehicles. The WWNF under the LRMP (1990) is open to cross country travel except where expressly designated closed to cross country travel under a CFR for specific roads or areas.

Temporary roads constructed under previous authorizations or decisions may still be evident. There is no inventory of temporary roads for the analysis area. Unauthorized roads existing within the analysis area have not been inventoried and are not considered part of the transportation system.

Wallowa County has jurisdiction of 35.99 miles of road providing links to private lands with and adjacent to the analysis area. Any use of these roads by the Forest Service will require an agreement between the county and the Forest Service.

About 6.13 miles of Oregon State Route 3 traverses along the western perimeter of the analysis area. A Memorandum of Understanding exists between the Oregon Department of Transportation (ODOT) and Region 6 of the USDA Forest Service describing the procedures and responsibilities for both parties where state highways intersect NFS lands.

## **Lands**

### **National landmarks, parklands, prime farmlands, rangelands, and forestlands**

There are no national landmarks, parklands, prime farmlands, nor prime rangelands in the project area. The project would not convert forestlands to other uses.

## **Direct, indirect, and cumulative effects by alternative**

### **Spatial and temporal context for project level effects analyses**

For the effects analyses the spatial context being considered is the 98,600 acres of NFS lands (project area). The baseline year used for this analysis is the year 2014 as the existing condition. In this analysis, all past activities and events are included in the existing condition description. In the effects discussion, post treatment refers to the time the final activity is accomplished (assumed to be the year 2024), “short-term” effects refers to effects over the 10-year period from the time the final activity was accomplished (year 2034). Beyond 20-years we will be considering effects as “long-term” (year 2054).

For the cumulative effects analysis, the spatial context being considered is the 178,000 acre analysis area. Cumulative effects are discussed in terms of changes in the existing condition due to present and foreseeable activities, including the effects of the alternative being discussed. The time frame considered is approximately 10 years in the future at which time the majority of the actions proposed will have been completed and the responses to these actions has occurred.

### **Alternative 1**

Alternative 1 is the no action alternative as required by 40 CFR 1502.14(c). There would be no changes in current management, including the continuation of fire suppression, and implementation of previous management decisions. Alternative 1 is the point of reference for assessing action alternatives 2 and 3.

## **Effects common to all action alternatives**

### **The physical environment**

#### *Surface Erosion*

Wildland fire management activities may increase surface erosion by reducing effective ground cover by burning or mechanical removal during fireline construction. Additionally, at certain temperature gradients, fire-induced water repellency may develop in soils which inhibits water infiltration and

increases surface erosion. (DeBano 2000). In Alt 2 and Alt 3, up to 90,000 acres of planned or unplanned ignitions may occur. Refer to the Vegetation Disturbance section of the DEIS for more information.

At the site scale, surface erosion may affect site potential and site productivity in areas where material is gained or lost through management activities. Additionally, changes in soil composition and structure may result in moisture content changes and subsequent drought tolerance. Organisms dependent on soil characteristics and wildlife dependent on vegetative conditions expressed by soil composition, structure and depth may also be affected by surface erosion. (Grigal 2000). However, due to the limited scope of the proposed treatments and the limited extent of potential effects when managed through Best Management Practices and Mitigation Measures, it is unlikely for these potential effects to extend beyond the site scale or to persist indefinitely. In all action alternatives, the effects of surface erosion would not compromise ecosystem components within or beyond the LJCRP.

#### *Sediment from road construction, road decommissioning, and road maintenance activities.*

Road construction and road maintenance activities have the potential to indirectly introduce fine sediment into stream channels. Road maintenance prior to log haul would help maintain the design drainage of the road surface which reduces the potential for larger sediment inputs to runoff that eventually enters stream courses. The action alternatives propose to re-open old temporary roads. Additionally, the action alternative also proposes to construct approximately 12.6 miles of temporary road. Temporary road reconstruction would re-establish several stream crossings, using temporary culverts. These roads would be decommissioned after project completion.

Maintenance of the existing system roads prior to hauling would include measures to upgrade the quality of the road bed and to improve road drainage. This includes the placement of new aggregate surfacing where necessary, blading, removing debris from landslides, brushing out encroaching vegetation, removing berms, ditch and culvert inlet cleanout where needed, and repairing several sections of asphalt road surface. Aggregate road surfacing greatly minimizes the amount of fine sediment from road surfaces entering streams following log haul, especially during and following rainfall events. Additionally, deep patch repairs to the roadbed are proposed along some segments of the haul route.

Road-related ground-disturbing activities have been designed to minimize the risk of sediment being transported to streams from erosion or surface run-off. Road work would be restricted to the dry season. This restriction would reduce the risk of surface erosion due to ground disturbance. The 12.6 miles of temporary road construction crosses four intermittent streams.

All new temporary roads and re-opened temporary roads would be decommissioned and re-vegetated directly following completion of harvest operations to help reduce compaction, increase infiltration rates, minimize surface erosion, and re-establish natural drainage patterns.

Road maintenance prior to log hauling also increases the risk of road related sediment entering streams near road crossing during rainfall events. This increase is associated primarily with aggregate and native surface roads although ditch cleaning associated with paved roads is a potential sediment source. Any fine sediment created by road maintenance activities would most likely be washed from the road surface in the first few precipitation events of the fall that are sufficient to cause runoff from the road surface. Although there is a possibility of increased sediment entering streams due to these activities, most road-related sediment would be trapped and stored in the ditches or on the forest floor below cross drains.

#### *Sediment from log haul*

Log hauling along aggregate surface or native surfaced roads has the potential to introduce sediment in small quantities to streams. Traffic breaks down surfacing material resulting in finer surface gradation and increased sediment transport from the road surface. Any fine sediment created by hauling traffic would more than likely be washed from the road surface in the first precipitation event that is sufficient to

cause runoff from the road surface. Any input of sediment is expected to be minimal as the roads where there is a potential for surface run-off are asphalt or durable crushed rock. Native surfaced road use would be restricted to periods when road related runoff is not present and as such, little sediment is expected to leave the road bed while haul is occurring.

During the wet season, log haul would only be permitted on asphalt and rocked roads when conditions would prevent sediment delivery to streams. In periods of high rain-fall, the Forest Service would restrict log hauling when necessary to minimize water quality impacts. Haul would be stopped if there is rutting of the road surface or a noticeable increase in the turbidity of water draining to the road ditches or at stream crossings.

Log hauling would not measurably increase the amount of fine sediment in streams. The roads along the haul route are rocked or paved at stream crossings, and road ditches are well vegetated. Road maintenance prior to log haul would help maintain the design drainage of the road surface which reduces the potential for sediment to runoff into stream courses. Road maintenance and repair would have a beneficial effect on slope stability would reduce the risk of water quality and resource damage from the use of these roads. The potential for sediment input into streams along the haul routes would further be minimized by permitting haul only when conditions would prevent sediment delivery to streams. Any sediment that could enter a stream during haul activities would be at stream crossings along aggregate surfaced roads. The majority of these crossings are at intermittent or small perennial streams that would have very little flow, during the normal season of operation. An analysis of sediment delivered from haul routes and temporary roads to stream reaches was conducted using the Watershed Erosion Prediction Project model. Modeling indicates that there is negligible difference in the sediment derived from haul between alternatives 2 and 3. Alternatives 2 and 3 use approximately the same haul system.

### *Chemical contamination*

Under Alternatives 2 and 3, a dust abatement spill or petroleum spill could potentially result in direct effects to aquatic resources and the beneficial uses of water. Dust abatement would be applied to gravel haul roads as needed, up to 260 miles total over the lifetime of the project. The risk of water contamination due to the application of dust abatement is minimized under the action alternatives by several mitigation measures that would be required under the timber sale contract. Dust abatement with chemical compounds under Alternatives 2 and 3 include maintaining an average 100 foot no-application buffer at perennial stream crossings and maintaining a 100-foot no treatment area adjacent to the outside edge of the road along the ditch line. Moreover, the application of dust abatement materials would normally occur only once per year in a window of time when no rain is forecast for at least three days. The buffering of applications away from perennial stream crossings has been found to effectively mitigate pollution of adjacent waters (USDA 1999). The rate of application of dust abatement compounds in the planning area would be “typical” and therefore is not expected to contribute to adverse riparian or aquatic effects.

Magnesium chloride is typically used on a limited basis and at low application rates, as compared to study areas where the most noticeable effects have been seen. Based on the literature review and typical application rates for dust abatement purposes that would be used in the LJCRP planning area, effects from these compounds to plants and animals in the riparian and aquatic environments would be negligible under the action alternatives.

Timber sale purchasers would be required to have spill prevention and recovery equipment on site, they would be required to develop spill prevention plans if substantial amounts of fuel or other pollutants are stored in sale areas, and traffic control measures would be required in the timber sale contract. All of these requirements associated with Alternatives 2 and 3, detailed in Chapter 2, function to diminish the chances that potential direct effects to aquatic resources and the beneficial uses of water from project-related

pollutants would actually occur. Thus, risk of chemical contamination is considered to be low for both Alternatives 2 and 3.

The action alternatives would present more risk of indirect effects to downstream beneficial uses because of the amount of potentially polluting products transported to the project area. Alternatives 2 and 3 present similar risks of an accidental spill contaminating off-site or downstream waters and the beneficial uses of those waters. The likelihood of an accidental spill is believed to be low under the action alternatives; therefore no mitigation measures would be applied to the transport of potential pollutants outside the timber sale areas.

### *Mining*

The direct effect to mining prospectors or future mining operators is a possibility in that the selection of these alternatives would increase administrative oversight by the agency for travel by persons entering the national forest for the purpose of mining or prospecting.

If, as a result of implementing these alternatives, roads that are not designated as available for motor vehicle travel because they will be removed or will be physically closed with barriers, berms, or gates will limit access without additional coordination with the District Ranger and additional administrative oversight. Due to the current absent demand for mineral resources within the analysis area and limited proposed closures across action alternatives, the anticipated direct and indirect effects to mining are minimal.

Generally, all alternatives (including Alternative 1) have the potential to increase the social and economic impacts to mining operators. In all alternatives, the potential for previous physical closure decisions to be implemented could continue to occur into the foreseeable future. It is expected that without a regular rotation of vegetation projects combined with the lack of public clearing of undesignated roads and unauthorized roads, it is highly likely that many will begin to re-vegetate within a 10 year period and would be grown closed within a 15 year period, decreasing motor vehicle access. It is unknown how much of an issue this will become; however, it is recognized as a potential effect of designated motor vehicle routes.

As roads are physically closed or decommissioned over time by previous site specific project decisions or they grow closed due to lack of maintenance, the cost to mining operations will increase as the burden to open and maintain access roads for mining shifts from the government to the operator. The operator would have to assume all cost associated with maintenance, operation, and reclamation of the road.

Socially, the need for regulatory oversight may increase under all action alternatives as roads are closed and decommissioned. Economically, the cost associated with maintaining roads to a standard that reduces impacts to adjacent national forest resources would be the responsibility of the operator. Due to the current absent demand for mineral resources within the analysis area and limited proposed closures across action alternatives, the anticipated cumulative effect to mining is minimal.

### *Mass Wasting*

At the landscape scale, surface erosion may increase substantially in the event of a large scale disturbance. The treatments proposed in all action alternatives will mitigate some of this risk by restoring stand structures and species compositions (see Fire and Fuels Report).

### *Water quality and temperature*

The LJCRP is in compliance with the Water Quality Management Plans derived from the Lower Grande Ronde Subbasins TMDL (2010). By implementing and monitoring water quality related Best Management Practices we would minimize the probability of degrading waters within the planning area or downstream. Any effects would be short lived and only detectable at the site scale.

Under the Action Alternatives, the proposed activities may indirectly benefit water quality by potentially reducing the extent and/or severity of wildfires. High intensity wildfires and emergency fire management have the potential to degrade water quality through increased runoff and erosion, accelerated nutrient inputs and through chemical spill or misapplications of fire retardant.

### *Chemical Contamination*

Most past and on-going land management operations throughout the Lower Grand Ronde basin such as silvicultural activities, timber sales, and all forms of road work use a variety of potentially polluting products (such as dust abatement, petroleum, concrete, adhesives, cleansers, herbicides, etc) that pose a risk of entering waterways if spilled or mishandled. The level of timber harvest and associated road work on Federal land has diminished over the last two decades relative to the previous three decades. Therefore, the level of additive effects that can contaminate water from such actions has also diminished.

Potential contamination of waters within the river basin associated with private lands development has not diminished. Water contaminations from these sources can be expected to increase as demand for food and natural resources increases with the human populations. Therefore, the lower areas of the Lower Grande Ronde subbasins are where the cumulative effects of all the additive forms and sources of water contamination would be most likely realized.

The probability of the action alternatives resulting in any cumulative effects to water contamination hinges on whether a substantial spill of petroleum or dust abatement products occurs. Should a spill occur and clean-up measures fail, a cumulative effect could be realized. This is particularly true the further downstream an accidental spill occurs.

None of the alternatives are expected to appreciably affect water quality over the long-term (decades, or longer), and none are expected to contribute to chemical contamination or have a measurable effect on the nutrient regime unless an accidental spill were to occur. The chances of such a spill are offset as much as possible by a series of Best Management Practices required in the timber sale contract associated with both action alternatives.

Any impacts to water quality associated with contamination of water due to timber sale operations would be short-term and likely localized. As such, the broad-scale goals of the Lower Grande Ronde TMDL (2010) and PACFISH strategies would not be compromised.

### *Water quantity - streamflows*

The proposed activities will have no direct, measureable effect on the hydrographs for waterways within the LJCRP area. Though we lack a consistent record of streamflow data within the LJCRP area, other waterways adjacent to the planning area do not indicate a strong peak flow response (US Geological Survey 2014). No new permanent roads are proposed in any alternative. The proposed road closures and decommissioning in the action alternatives are unlikely to produce a measurable response in streamflows. Moreover, the intensity of the proposed treatments will not alter stand densities in excess of the range of variation (See Silviculture Sections). However, if the proposed treatments are successful in the mitigating the risk of a high intensity wildfire, there may be an indirect benefit of reducing the probability of adverse wildfire effects (widespread loss of canopy cover and ground cover, soil hydrophobisity) that have the potential to modify the timing and intensity of streamflows.

### *Water Quantity - groundwater*

Pursuant to the proposed Forest Service Groundwater Directive (FSM 2560), groundwater resources were evaluated in the LJCRP analysis. The proposed activities will have no direct, measurable effect on groundwater resources. Source water protection will be satisfied through the implementation of Best Management Practices (Appendix J) and PACFISH RHCA treatment buffers. Water withdrawals and minerals resource management are not part of any action alternative. Equipment supporting the proposed

restoration activities has the potential to locally and temporarily impact groundwater resources in the event of a chemical spill (See discussion on chemical contamination and streamflows).

### *Wetlands and Floodplains*

The proposed action alternatives would have no adverse impact on floodplains or wetlands as described in Executive Orders 11988 and 11990. Floodplains and wetlands will be protected by applicable PACFISH RHCA buffers in Alternative 3. In Alternative 2, conifers encroaching on the valley bottom meadow along approximately 3 miles of Swamp Creek may be thinned to meet Riparian Management Objectives by taking steps to restore structure, pattern and species composition of overstory vegetation (Appendix J). All other floodplains and wetlands will be protected by applicable PACFISH RHCA buffers in Alternative 2. Wetlands were initially identified through a review of the National Wetlands Inventory data that were derived from selectively field validated remotely sensed data. Floodplains were modeled using digital elevation models and calculating the area inundated during a 100-year flood (See Physical Environment Report).

### *Air Quality*

Prescribed burning of forest fuels (logging slash or natural) will comply with Oregon Administrative Rules (OAR) 629-048-0001 to 629-048-0500 (Smoke Management Rules) within any forest protection district as described in OAR 629-048-0500 to 0575. These rules establish emission limits for the size of particulate matter (PM<sub>10</sub>/PM<sub>2.5</sub>) that may be released during these activities.

Huff (1995) found PM<sub>10</sub> smoke production was twice as high for wildfires as for prescribed fire because wildfires generally occur during drought periods in which there are low fuel moistures and more fuel available for consumption. Their research in the Grande Ronde Basin found the following levels of PM<sub>10</sub> emissions (Table 58). This study did not look at PM<sub>2.5</sub> as a subset of PM<sub>10</sub> but smoke production models used to submit burn plans to the State of Oregon at the time of implementation will show the respective levels. Past experience with this modeling has shown a similar trend in the level of PM<sub>2.5</sub>.

**Table 58. PM<sub>10</sub> emissions in the Grande Ronde Basin for prescribed fire and wildfire**

<b>Fire Type</b>	<b>PM 10 (tons/acre)</b>
Wildfire	0.318
Prescribed Fire	0.167

Under both action alternatives up to 90,000 acres are available to manage with fire thus air quality and smoke emissions would be similar and would follow the established rules to comply with the Clean Air Act prior to implementing planned ignition or using unplanned ignitions to benefit restoration objectives. The number of acres accomplished per year will be determined by established emission limits negotiated with the State of Oregon, funding, appropriate burn conditions, and personnel availability.

## **The biological environment**

### *Disturbance and fire regime*

#### **Harvest, stand improvement, and prescribed fire (planned and unplanned ignition)**

Treatments under both action alternatives are designed to use evidence based ecologically informed principles to restore function and processes and appropriate disturbance regimes in a landscape created by disturbance. Following guidelines found in Franklin et al. (2013) and local range of variability estimates inform how disturbance regimes regulated forest structure and composition and contributed to landscape resilience. The two action alternatives manipulate forest structure, density, and composition as well as

landscape pattern in a way to reduce uncharacteristic disturbance due to density dependent mortality (insects) and compositional influenced mortality (disease and fire). These treatments also lead to a reduction in uncharacteristic moderate and replacement severity fire as a result of an increase in fire-intolerant species, decreased abundance of fire-tolerant species, multi-storied stands that increase ability of fire to influence canopy fuels, and densification of forest stands across the landscape that increase the continuity and amount of fuel across the LJCRP area.

Prescribed fire as a silvicultural tool is critical to restoring health, resiliency, adaptability and process to the forested landscape within LJCRP. Franklin et al. (2013) indicate that fire will be a constant in the dry forests of eastern OR and WA and will neither be eliminated nor would it be desirable to do so. Both action alternatives recognize the ecological need to manage fire (planned and unplanned) to meet the purpose and need of this project and to move the landscape towards more resilient conditions while mitigating undesirable effects of higher proportions of unnaturally high severity fire. There would be areas of mixed severity that provide opportunities to regenerate early seral species at the stand and landscape scale. These opportunities may vary in size from < 1 acre to 10's of acres. These conditions would affect the LJCRP at an ecologically important scale for the types of forested systems found in the project area.

Under the two action alternatives up to 90,000 acres of prescribed fire would be available for implementation. It is anticipated that some of this would be done using planned ignitions but realizing the limitation of burn windows, cost, and personnel this project encourages the use of unplanned ignitions so long as it is exhibiting fire behavior conducive to meeting the restoration objectives described in Chapter 1.

Planned ignition priority areas are identified for the action alternatives and described in the project design features for this document. High priority areas represent the acres that are treated with either harvest or SI, or are in the dry upland forest potential vegetation group. Prescribed fire following harvest or SI serves to “complete” the first restoration step by mechanically moving forest structure, density, or composition towards the reference conditions as well as returning fire as a natural disturbance process to create natural patterns of heterogeneity. On acres treated with a combination of cutting and fire the departure from the natural fire regime will be moved toward desired conditions.

On high priority areas outside harvest and stand improvement (SI) areas, wildland fire would be used to alter forest density, structure, composition, and pattern. In general, density would be reduced due to small diameter tree mortality to canopy consumption or cambium scorch, and this would move the landscape closer to RV and begin to restore natural disturbance regimes. Improving large and old forest structure would occur by fire supporting restoration of old or early seral trees species of large size and reducing the number of smaller diameter young trees within the stand. Early seral tree species would be favored (not killed) by fire due to their inherent adaptive strategies to survive fire (thick bark, self-thinning crown, etc). Returning fire to the system is a direct way to influence the restoration of reference conditions, disturbance regimes, and reference patterns on the landscape. There would be areas of mixed severity fire (similar to a group selection harvest) that would provide the necessary environment to successfully regenerate early seral species across the landscape, a characteristic that is currently underrepresented. The moderate priority areas are located in the moist upland forest potential vegetation group and would experience a higher relative probability of moderate/replacement severity fire. Low priority areas are dominated by non-forest vegetation and are not critical to meeting the forested vegetation portion of the restoration objectives.

### *Activity Fuels*

Activity fuels, slash and brush derived from cutting in the harvest and SI treatments, would create a short term increase in fuel accumulation and potentially increase the severity of wildfire should it occur prior to

fuel treatments. Activity fuels would be treated in a variety of ways including, but not limited to, mastication, removal, pile (grapple or hand) and burn, cutting and scattering limbs, or prescribed fire.

### *Fire Management Decision Space*

The action alternatives provide options for fire management to utilize planned and unplanned ignitions to influence the resilience and restoration of the LJCRP by reducing the amount of uncharacteristic fire severity, albeit to differing degrees. The primary difference between the action alternatives in this respect is the indirect effect of limiting fire management opportunities under alternative 3 by no harvesting or conducting SI work in IRA, PWA, designated old growth, or RHCAs. Alternative 2 prepares more acres for the re-introduction of fire and therefore gives more options for using fire to protect important resource values such as old trees, late and old structure forests, riparian habitat conservation areas, wildlife habitat, IRA characteristics, PWA characteristics, or designated old growth. Alternative 3 treats less acres overall and in particular the areas that have the greatest social concern for harvest or SI. By eliminating treatment in the IRA, PWA, RHCA, and designated old growth under alternative 3 these areas would continue to develop structure, density, and composition that present a higher proportion of uncharacteristically severe wildfire such that it limits the decision space and comfort of fire management to allow planned or unplanned fire to reclaim its role as a restorative process both within these areas and areas immediately adjacent to and outside that would also benefit from fire.

### *Forest vegetation*

Features specific to desired condition objectives have been designed into the action alternatives to prevent impacts and meet the standards and guidelines in the WWNF forest plan, as amended, under this EIS, and meet the LJCRP purpose and need. The comprehensive silviculture design is documented in Appendix J - Project Design Features, Mitigation Measures and Best Management Practices.

Table 59 describes the treatment types that are proposed in the action alternatives. See the project record for the decision matrix used to determine treatment type and intensity to move project area toward RV.

**Table 59. Description of treatment types**

<b>Treatment Types</b>	<b>Treatment Description</b>
Savanna	Reestablishment of grassland/forest edges and historic grasslands that have conifer encroachment.
Single Tree Selection (STS)	ICO variable density thinning within all age classes present
Group Selection (GS)	ICO variable density thinning within all age classes present; ½ to 4 acre group selection to initiate new cohort of seral species (PP/WL).
Intermediate Treatment (IT)	ICO variable density thinning within all age classes present with emphasis on isolating mistletoe infections and creating conditions that reduce intensification of infection.
Stand Improvement (SI)	ICO variable density thinning within young, post disturbance stands.

The STS, GS and IT treatment types have a treatment intensity associated with them (high, moderate, low) indicating a post treatment desired density class. Table 60 illustrates the change from existing density class to post treatment density class based on treatment intensity.

**Table 60. Relationship of treatment intensity to the desired post treatment density class**

Post Treatment Density Class ↘		Treatment Intensity:		
		High	Moderate	Low
Existing Density:	High	Low	Moderate	High
	Moderate		Low	Moderate
	Low			Low

### *Rangelands and understory vegetation*

Direct effects to rangeland resources and understory vegetation from LJCRP activities include temporary loss of understory vegetation including forage plants, through ground disturbance from logging activities, crushing and piling related to logging activities and prescribed fire. Map 5 (Appendix A) shows the locations of invasive plants relative to project activities. Physical effects of prescribed fire, where soil is heated can create areas where soil biota such as ectomycorrhizal (ECM) fungi, desirable bacteria, and invertebrates are killed. Small slash piles result in moderate soil heating in the surface 5 to 10 cm (2 to 4 in). The range in reported temperatures does not suggest any major changes in soil properties with the exception of potential root, seed bank, and microbial mortality. Large slash piles, especially those containing a high proportion of large-diameter wood result in high soil temperatures and long heat durations. Detrimental heating effects on soil properties should be expected in the top 10 cm (4 in) or more (Busse 2014). Prescribed fire can be beneficial under the right circumstances. Forest underburning produces minimal soil heating except in areas where duff layers are completely consumed. Therefore, detrimental heat damage should not be expected in most cases. Grassland fires produce nominal soil heating. The dominance of fine fuels in these systems ensures that burn duration time is generally low and soil temperatures are minimal (Busse 2014).

Indirect effects include increased risk of spreading invasive annual grasses and noxious weeds through road construction, grading, and rocking, logging related activities, and prescribed fire when seed sources are available. The introduction of seed sources from logging equipment, shoes and clothing of workers and recreationists, as well as by wildlife and livestock is also an issue where bare soil is exposed. Thinning logging, and prescribed fire may facilitate exotic species invasions by disturbing existing vegetation, exposing mineral soil, facilitating the spread of propagules, reducing shading, and increasing soil resource availability (Dodson et al. 2008) with the strongest response when a combination of thinning and burning is used (Metlen and Fiedler 2006). Project design criteria (see Invasive Plant specialist's report and Appendix J) would reduce risk of spreading invasive non-native plants.

Loss of forage and understory canopy cover through logging and burning activities may require a period of rest prior to grazing, depending on the time of year treatments occur, how much bare soil is exposed, and the condition of understory plants after treatments. This would have to be determined by the range manager and botanist after treatments have been implemented.

The amount of forage and understory vegetation depends on many factors, such as annual variations in precipitation, heat, soil, and competing vegetation. Low to moderate intensity fire may increase fire resilient grass species such as pinegrass (FEIS 2014). Benefits from silvicultural treatments and prescribed burning may include increases in forage and browse canopy cover. Relationships between tree canopy density and understory plant growth have been developed for major forest cover types in Montana, similar to forest cover types in LJCRP. In general, a tree canopy that covers more than 50% of the open sky will shade out most understory plants rendering the site unproductive for grazing. Decreasing the amount of forest canopy cover to less than 50% results in a proportional increase in forage production until the tree canopy cover has been reduced to 10 - 20%. Understory vegetation in ponderosa pine forests increased proportionately to decreases in crown cover until a canopy cover of 20% was left. Further thinning resulted in no further understory increases. Canopy thinning in stands of Douglas-fir, on

the other hand, showed continuous increases in forage production until the stand was clearcut (Kolb 1999). Young (1965) found that shrubs in dry upland forest (ABGR) had the highest cover when tree canopy was 21 to 35% and grass species were most productive between 0 and 20% tree canopy cover. Other studies show no such relationship (in Ponderosa pines stands with cover between 20 and 50 percent) (Krueger 1981). Long et al. (2008) described an increase in forage cover in the spring in stands where tree canopy had been reduced, however by summer the forage cover had decreased due to desiccation. Treatments in Alternatives 2 and 3 would have the most impact where post treatment takes density to less than 40% cover. Moist upland forest treatments where density would be reduced to less than 40% canopy cover would occur on less than one percent of the LJCRP area. It is doubtful there would be enough reduction in cover to increase native forage grasses, such as elk sedge, pinegrass, Idaho fescue or blue-bunch wheatgrass in moist upland forest stands. However, there should be improvement in dry upland forest treatments where about 11% of the total LJCRP area would have canopy cover taken to low density (below 40% canopy cover).

### *TES Plants*

Map 4 (Appendix A) shows the locations of TES plants relative to project activities. There are no documented TES plant species in coniferous forest habitat within the LJCRP. However there are four bryophytes (*Buxbaumia aphylla*, *Ptilidium pulcherrimum*, *Schistostega pennata*, *Tetraphis geniculata*), two fungi (*Rhizogogon subclavitisporus*, *Rhizopogon bacillisporus*), and two vascular plants (*Carex cordillerana*, *Cypripedium fasciculatum*) suspected in forested habitats in the project area

There is only one historic record of *C. fasciculatum* from the Wallowa-Whitman NF and efforts to relocate this orchid have not been successful. *Rhizopogons* live below ground, making them difficult to detect and neither species has been found in our area, although *R. subclavitisporus* is documented from northern Idaho. Bryophytes such as *Ptilidium pulcherrimum* and *Tetraphis geniculata* require moist shady microsites.

Direct effects to forested areas would be caused by machinery and tree felling crushing vegetation and disturbing and compacting soil. All TES species suspected in conifer forest habitat would be subject to the effects of logging and thinning activities that crush vegetation and/or disturb soil.

Prescribed fire after silvicultural treatments would remove understory vegetation, woody debris, and litter, impacting microclimate as well as soil temperature and moisture. Pacific yew (*Taxus brevifolia*), a species of concern for the WMO district, is extremely sensitive to changes in microclimate and requires canopy closure to thrive, as well as long periods without disturbance (Busing 1995). Yew is found in the LJCRP in closed canopy mixed conifer stands in moist sites, in fact, Johnson (1998) describes yew as an indicator of a high water table.

Indirect effects to forested areas resulting from logging and thinning would be loss of canopy closure and resulting changes in microclimate. *Cypripedium fasciculatum* and *Listera borealis* are both in the orchid family and probably require mycorrhizal fungi to establish. *Rhizogogon subclavitisporus* and *Rhizopogon bacillisporus* are mycorrhizal fungi. Mycorrhizal fungi are vital to nutrient and water uptake for many vascular plants including conifers. Many edible mushrooms found in coniferous forest are mycorrhizal including morels, boletes (Porcini), and truffles. Changes in soil temperature and moisture can change the mycorrhizal community, or eliminate it. Loss of coarse woody debris changes soil moisture retention during dry months, also affecting mycorrhizal fungi (Lippert 2014).

In general the suspected TES species in LJCRP are found in moist upland forest rather than in dry upland forest. Direct and indirect effects May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To The Population Or Species (MIIH). In the case of culturally significant plants, morel habitat may benefit from light burning. Pacific yew is fire intolerant and slow to recover after wildfire (Busing 1995).

Grasslands include both moist and dry bunchgrass habitats. There are two grassland species documented in the LJCRP, *Calochortus macrocarpus* v. *maculosus* and *Pyrrocoma scaberula*. Both are regional endemics, meaning they are only found in our part of the world. There are thirteen records (Oregon Biodiversity Information Center) of *Pyrrocoma scaberula* in the Joseph Canyon area, only one is in the project area, the other twelve are adjacent, with eleven on Nez Perce precious lands and one on BLM land. *Calochortus macrocarpus* v. *maculosus* is slightly more plentiful with ten populations within LJCRP and another six populations on other land ownerships. Both *Calochortus macrocarpus* v. *maculosus* and *Pyrrocoma scaberula* are concentrated at the very north end of the LJCRP, extending north into other land ownerships. The known site of *Pyrrocoma scaberula* is not near any project activities.

Two *Calochortus macrocarpus* v. *maculosus* populations are adjacent to units that would be treated in Alternative 2, but not treated in Alternative 3. *Carex duriuscula*, *Delphinium bicolor*, *Silene spaldingii* are suspected to be within the project area and suitable habitat exists. Approximately 14, 840 acres of potential habitat, identified using a habitat model for *Silene spaldingii*, is within 300 feet of LJCRP units. All of the grassland species tend to grow in grassland between stringers of forest.

Potential direct effects to *Calochortus macrocarpus* v. *maculosus* include crushing by logging machinery and piling, as well as soil disturbance from the same. Indirect effects could be negative in the case of spreading invasive annual grasses and noxious weeds through ground disturbance and prescribed fire. Positive indirect effects could be the removal of conifers encroaching into grassland stringers and nitrogen release as a result of prescribed burning. Direct and indirect effects to grasslands May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To The Population Or Species (MIIH).

Moist Meadows, Wet Meadows, Riparian, Springs and Seeps: There are no documented species from moist meadows, wet meadows, riparian areas or springs and seeps. Suitable habitat for mesic TES plant species has limited potential to be directly impacted by the vegetation management activities proposed for the LJCRP, because nearly all the riparian areas and other mesic features are protected by INFISH buffers. A very limited amount of timber harvest and log skidding would occur in RHCAs. Along Category 1 and 2 streams, a minimum 100 foot buffer would be maintained. Category 4 RHCAs would be treated in alternative 2, but seeps and springs would be protected from logging and thinning activities, and there would be a 25 foot variable width no harvest and no equipment buffer established during implementation by a hydrologist or fisheries biologist. Direct and indirect effects are unlikely in these habitats.

Rock Outcrops, Talus, Scree: These habitats are unlikely to be affected by project activities. No impact from project activities to these species is anticipated.

Lithosols: There are three sensitive plants documented from lithosol habitats: *Achnatherum wallowaensis* (Wallowa ricegrass), *Erigeron disparipilus*, and *Erigeron engelmannii* v. *davisii*. The two *Erigeron*s are taxonomically difficult and virtually impossible to differentiate in the field. They would be considered together as “the white fleabanes”. These species grow in rocky areas nearly devoid of other vegetation, associated species are Sandberg’s bluegrass and rigid sagebrush. Wallowa ricegrass is known from Wallowa and Crook Counties in Oregon. The white fleabanes are suspected to hybridize in our area (Brooks 2009) although they are considered distinct species. Davis fleabane is endemic to southwest Idaho with disjunct populations in southwest Washington and northeast Oregon. Snake River daisy is found in Idaho near the Snake River and in northeast Oregon. Wallowa ricegrass, Davis fleabane, and Snake River daisy are all locally abundant in the project area, yet all should be considered narrow endemics, meaning they are not well distributed throughout the world, or even within the region.

Lithosol habitats within the LJCRP are frequently found between forested stringers on ridgetops and are generally flat, making them attractive locations for temporary roads, landings, and parking spots for logging equipment. During the course of the 2014 TES plant surveys many new populations of Wallowa ricegrass and white fleabanes were discovered, as well as extensions of previously documented

populations. The white fleabanes found in 2014 have not yet been identified to species and were all tentatively lumped into Davis fleabane.

Most of the new Wallowa ricegrass sites are extensions of existing sites. Wallowa ricegrass is found south of Coyote Campground in LJCRP. In general the white fleabanes are found north of Coyote Campground, with the largest concentrations in the Cold Spring Ridge vicinity and Wildhorse Ridge. Alternative 2 would have the most impact on Lithosol habitat, although the effects of Alternative 3 are still substantial. Direct effects to TES plants found on lithosols are crushing plants with machinery, burying plants during grading, landing construction, damaging plants during felling and yarding, and burying plants under slash piles. Indirect effects are soil compaction and spread of noxious weeds and invasive annual grasses (Brooks 2009, Dewey 2013). Mitigations: Known populations would be flagged prior to road grading and other road improvements, designation of parking areas and landings, with work overseen by District Botanist. In addition equipment operators would receive maps with known sites and instructions to avoid flagged areas. With mitigations both alternatives May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To The Population Or Species (MIIH) in Lithosols in LJCRP.

### *Wildlife*

#### **Primary cavity excavators**

Snag habitat is currently adequate in the PPDF habitat type, and below reference conditions in the EMC habitat type (moist forests). No snags are prescribed for harvest in any of the alternatives. However, it is likely that snag density will decline in areas treated due to safety, skid trails, firewood cutting, and other reasons (Harrod et al. 2009)(Hessburg et al. 2010). Prescribed fire will also likely result in loss of snags, particularly in the large (>20") size class (Finch et al. 1997, Pilliod et al. 2006).

#### **American marten**

Commercial harvest treatments in the LJCRP area would not contribute to the reduction of marten source habitat on the WWNF; large diameter trees and multiple canopy layers would be retained in both action alternatives. Treated stands would maintain canopy closure at  $\geq 60\%$ , and no trees  $\geq 21"$  dbh would be harvested in marten source habitat. It is assumed that post-harvest these stands will be maintained as source habitat. It is likely that in the short-term they may meet minimum qualifications as source habitat, but the quality of the habitat may be reduced due to reduced complexity and tree density, and potential loss of snags and logs due to logging operations and safety.

Approximately 35% of marten source habitat has some form of forest treatment (38% in alternative 2, 34% in alternative 3), which may cause a decline in the quality of source habitat in the short term. Approximately 110 acres (114 in alternative 2, 108 in alternative 3) would be harvested in marten habitat using group selection/moderate density. Group selections can include openings that are  $\frac{1}{4}$  - 4 acres. Martens respond negatively to low levels of habitat fragmentation (Hargis et al. 1999), it may be that openings as large as 4 acres will reduce the quality of the habitat for marten. In the longer-term, as trees continue to grow, American marten would continue to use these harvested areas for some or all of their life history functions.

Vegetation treatments, in both action alternatives, are assumed to modify fire behavior and reduce the effects of a stand replacement event, thereby retaining source habitat in the long-term. In both Alternatives 2 and 3, there would be a loss of down wood, resultant prey availability and subnivean access due to fuels reduction treatments (Bull and Blumton 1999).

Because this project proposes some commercial treatment and because the planning area is currently at the lower end of the HRV, the overall direct, indirect and cumulative effects will result in a small negative trend of habitat. The loss of habitat quality will be insignificant at the scale of the Forest and will likely be

short-term. The Lower Joseph Project is consistent with the Forest Plan, and thus continued viability of the American marten is expected on the Wallowa-Whitman National Forest.

### **Pileated woodpecker and northern goshawk**

The current condition, as well as the short- and long-term outcomes of the action alternatives, maintain or exceed source habitat with the HRV for both the pileated woodpecker and northern goshawk. Harvest treatments will reduce habitat quality in source habitat through the reduction in stand complexity, canopy closure, large snags, and trees with mistletoe. Additionally the loss of large trees in Alternative 2 will likely contribute to the loss of habitat quality in the harvested stands.

### **Rocky Mountain elk**

Harvest activities will result in a loss of cover (canopy closure > 40%) and an increase in potential forage (<=40% canopy closure) habitat. Research results on the effects of forest restoration treatments (thinning followed by primarily broadcast burning) in northeast Oregon have found that elk will likely respond positively to treatment in the spring due to an increased cover and abundance of some important forage species, while the opposite may be true for during the hotter summer months (Long et al. 2008a, Long et al. 2008b). In the summer areas with relatively open canopy cover, most grass species and many forb species have cured or senesced by about mid-July as a result of increased exposure to direct sunlight. Within untreated areas or areas with denser canopy cover, important forage species often persist for several weeks longer. The authors suggest that maintaining a mosaic of treated and untreated forest habitats across the landscape will likely be beneficial for foraging habitat. Recently research has shown that the adequacy of summer nutrition in the Pacific Northwest drives the productivity of elk and probably other ungulate populations (Cook et al. 2013).

### **Landbird and migratory bird habitat**

Effects from this project to neotropical migrants would be variable depending the species (table 67). The effects of treatments vary depending on intensity and extent. Treatments may temporarily setback mature shrubs currently functioning as nesting habitat, but would likely then rejuvenate these same plants by stimulating resprouting and new growth in the longer term. Shrub and forb densities may increase in the years after treatments and this favors some Neotropical migratory bird species (NTMBS; e.g., olive-sided flycatcher) that prefer these structures.

In the short-term, some nesting habitat may be lost because of logging and burning, but the scale and timing at which it would occur is not expected to significantly reduce NTMBS richness or abundance. Some birds may experience shifts in home ranges as habitat is altered, but treatments would not result in their complete displacement from the project area. There is no indication that habitat changes from the project would result in reduced numbers of these birds that would be meaningful at local or landscape scales.

### **Threatened, endangered, and USFS R6 sensitive wildlife species**

Any of the alternatives of this project would have No Effect (NE) to the Canada lynx because it is not considered present on the Forest (Wallowa-Whitman National Forest Lynx Strategy Letter April 19, 2007).

The action alternatives would preserve riparian habitat with a corresponding RHCA no activity buffers of Category 1, 2, and 3 (see specifics in Chapter 2). Tailed, and spotted frogs do not occur in Category 4 RHCA's which in some instances may have some tree harvest prescribed. These RHCA no harvest buffers (category 1-3) would not affect the canopy cover, flow and woody debris within and around occupied streams. Therefore all alternatives would have No Impact on the tailed and spotted frogs.

The LJCRP area may contain some incidental roosting habitat for bald eagles, but does not contain nesting habitat. None of the alternatives would alter this habitat enough to make it unsuitable for bald eagles; therefore this project would have No Impact on bald eagles or their habitat.

Peregrine falcons have been sighted within the watershed. Potential nest sites have been identified but suitable nest ledges are limited as are larger bodies of water for prey concentrations. The action alternatives would have No Impact on the peregrine falcon.

Habitat for the Lewis' woodpecker is uncommon in the LJCRP analysis area. Primary source habitat is provided in recent wildfire habitat; little of this habitat exists within the planning area. Riparian habitat and corresponding RHCA no activity buffers (see specifics in Chapter 2) would be conserved within the project area. Ponderosa pines over 21 inches dbh would not be cut and so large ponderosa pine habitat near riparian habitat would not be altered. Forest plan standards and/or guidelines protect large ( $\geq 21''$  dbh) trees and snags (see Appendix B). Vegetation treatments may produce source habitat in the xeric pine types through the reduction in canopy closure, though the potential loss of large snags may reduce habitat quality. Overall, there will likely be a beneficial effect to Lewis' woodpecker from both action alternatives.

The viability outcome forest-wide for the white-headed woodpecker historically was projected to be an "A" (suitable environments are broadly distributed and of high abundance across the historical range of the species), while currently the viability outcome is projected to be an "E" (suitable environments are highly isolated and exist at very low abundance relative to historical conditions). This results in a high level of concern for the viability of the white-headed woodpecker. The main factor leading to this level of concern is the historic loss of large, open canopied ponderosa pine habitat resulting in levels far below HRV for these habitats. The action alternatives equally increase the amount of source habitat composed of large, open canopied ponderosa pine forest. Both action alternatives should benefit the white-headed woodpecker.

The primary threats to wolves are human disturbance, mortality from shooting and vehicle collisions (Wisdom et al. 2000). Primary concerns for activities in the LJCRP area are 1) disturbance to denning or rendezvous sites, and 2) providing adequate habitat for populations of prey species such as elk (USDA Forest Service 2009). No denning or rendezvous sites have been identified within the project area, and the action alternatives are not expected to impact big game prey availability (see section on Rocky Mountain elk). Any of the alternatives would have No Effect (NE) to the gray wolf (Wallowa-Whitman National Forest Gray Wolf Listing Letter April 27, 1999).

Fringed myotis appears to be most common in drier woodlands roosting in large trees and snags. Alternatives 2 and 3 propose commercial harvest treatments on 16,700 acres 10,200 acres respectively. Though snags are not prescribed for harvest, large snags will be removed due to safety and logging operations (e.g. skid trails), additionally in Alternative 2, the potential removal of large trees ( $\geq 21''$  dbh) may be removed. These large trees will result in a loss of potential roosting habitat. The road closures proposed in Alternative 2 will reduce the loss of future snag loss caused by firewood cutting and safety. With this taken into account, Alternative 2 and 3 May Impact Individuals or Habitat (MIIH) but are not expected to lead to a population decline of the species. No management activities are proposed in any of the alternatives at potential caves or mines that may provide Townsend's big-eared bat habitat. Although treatment is anticipated within foraging habitat for this species, it is to be undertaken with the intent of restoring vegetation to what was expected to occur historically. It is likely that proposed management activities may impact individuals or habitat (MIIH) under any alternative but will not contribute to a trend towards federal listing or cause a loss of viability to the population or species.

*Aquatic habitat***Stand Improvement Activities**

Alternative 2 and Alternative 3 propose 749 acres of stand improvement treatments within category 4 RHCAs. These acres would be treated to move these acres towards HRV for the planning area. Treatment prescriptions would follow the activity restrictions as described in Table 61 for all category streams.

**Table 61. Activity restrictions according to the Blue Mountains Project Design Criteria**

<b>PACFISH/ INFISH Category</b>	<b>Fish Bearing and Designated Critical Habitat Streams</b>	<b>Permanently Flowing non- fish Bearing and Ponds, Lakes and wetlands &gt; 1 acres</b>	<b>Seasonally Flowing or Intermittent Streams, wetlands &lt; 1 acres, landslides and landslide- prone areas</b>	<b>RHCA Restrictions*</b>  <b>(Activities allowed outside the no activity stream buffer**)</b>
<b>Activity</b>	<b>Default No Activity Buffers</b>			
Thinning in RHCAs	100'	75' on slopes < 30%	50' on slopes < 30%	treatment by hand only (no ground based equipment) prior to treatment 500 – 2,500 stems per acre; post treatment fully stocked (generally 175 – 220 trees per acre) variable spacing all shade providing trees and long term wood recruitment trees retained only trees < 9" dbh

**Timber Harvest Activities**

Impacts to the RMOs for pool frequency, large woody debris (LWD), bank stability, lower bank angle, and width-to-depth ratio are unlikely. Thinning units, skid trails, and landings would not be located in RHCAs under the action alternatives. Restricting these activities to areas outside of RHCAs would prevent adverse impacts to existing pool habitat and future pool habitat. RHCA widths for Category 1 streams are sufficient to prevent removal of trees that have the potential to fall into stream channels as LWD and create pool habitat.

Impacts to channel morphology RMOs (i.e. bank stability, lower bank angle, and width-to-depth ratio) would not occur because activities that could result in mechanical bank disturbance would not occur in RHCAs under the action alternatives. Some areas of decreased bank stability may occur where herbaceous vegetation along streambanks is top-killed during burning activities.

**Prescribed Burning Activities**

Impacts to the RMOs for pool frequency, LWD, bank stability, lower bank angle, and width-to-depth ratio are unlikely. Proposed burning activities would not likely impact existing LWD or future LWD because the burn prescription would target consumption of material 3 inches and smaller. Fire intensities would not be high enough to consume trees or downed wood large enough to function as LWD (> 20" dbh) in

stream channels. Prescribed burning activities would follow guidance outlined in the Blue Mountains Project Design Criteria, and therefore burning activities are not expected to result in a reduction of current or future levels of LWD or pool habitat under the action alternatives.

### **Management indicator species – fish**

All of the LJCRP activities proposed would occur upstream from MIS fish, with the exception of approximately 58 acres of treatment along Swamp Creek. The direct effects to MIS fish species from this treatment would not be measurable. Therefore, there is no potential for direct effects to any MIS. There is potential for indirect effects to MIS downstream from the proposed activities because of their proximity to the project area. Aquatic habitat indicators potentially affected include fine sediment levels and LWD quantities. Road management could cause changes to local hydrology such as increased runoff rates, accelerated erosion and sedimentation. Tree removal could potentially reduce large wood availability in headwater streams and not directly associated with MIS fish bearing streams. MIS life stages present in the area of exposure from the project include juvenile, adult, and eggs. These activities will occur upstream from MIS fish.

Implementation of Standards and Guidelines in the Forest Plan as amended by PACFISH (USDA/USDI 1995) and LJCRP Project Design Criteria would avoid negative indirect effects to MIS. Road maintenance would result in an overall net reduction of road-related sediment delivery during the project and in the long-term. Road closures and some decommissioning proposed under Alternative 2 would result in further net reduction of road related sediment delivery. The result would be a beneficial effect to the sediment regime, caused by a reduction of anthropogenic-derived sediment delivered to the stream network as compared to current watershed conditions. Additionally, thinning densely stocked stands in the outer edge of RHCA's restore natural species composition and promote large tree growth. The largest trees are retained at expected stand densities. On perennial and fish bearing streams, there is a no harvest buffer 300 to 600 feet wide (total width) which when considered along with site potential tree height in the project area, will maintain all existing LWD that could potentially fall into streams.

Effects of the proposed action on MIS species or their habitat across the project area, when considered cumulatively with other activities in the project area, would be beneficial to some of the important habitat indicators. A net decrease to fine sediment levels is expected, which would improve habitat conditions for MIS and their habitat. Reduced sediment delivery improves important aquatic elements such as cleaner water, higher quality substrates for spawning and rearing habitat, and less pool infilling. Thinning densely stocked RHCA's improves vegetation conditions, which leads to increased large wood recruitment and creates more fire resilient stands along streams. The cumulative effects are within the scope of anticipated effects to aquatic resources determined in the forest plan (USDA 1990).

The LJCRP would improve habitat conditions for the aquatic MIS in the project area. Anthropogenic fine sediment delivery in the project area will be decreased as soon as project activities begin and reduced delivery will be maintained after the project is completed. In the long-term, there would be a reduction in artificially induced sediment entering the stream system, benefiting aquatic MIS and their habitat. Therefore, the project will not contribute to a negative trend in viability on the Wallowa-Whitman National Forest for these species.

## **The social environment**

### ***Recreation***

The available types and annual use for dispersed recreation activities would not be affected unreasonably in the short and long term. No prohibitions are being made to the dispersed activities. Dispersed uses may fluctuate each year but other factors like weather, choosing a different vacation destination, fuel prices, and success/non-success of obtaining a hunting tag also influences use in an area.

The number, annual use and site capacity for developed recreation sites would not change in the short or the long term under any action alternative. All developed recreation sites would remain open, no individual campsites/grounds would be altered, and as mentioned above use varies depending on factors other than the level of project activities.

The number of trail miles and use would not change in the short or long term. No prohibitions are being made to the number of trail miles or trails open and available for use. No change to cross-country travel is proposed in any alternative within the LJCRP area.

The number of permits and areas would not change in the short or long term. No changes in the terms of the permits or available locations are part of this project.

The specific project activities with potential to impact recreation are common to all the proposals in alternatives 2 and 3. Each of these alternatives propose different levels of activities but the effects to the public involved in different recreation endeavors common to the area are relatively the same. Both alternatives would include four main project activities that would affect recreation:

- Commercial harvest
- Stand improvement harvest
- Prescribed burning (including post-harvest fuels treatment)
- Road and Access activities (i.e. danger tree removal along open system haul roads, haul roads, temporary road construction, permanent road reconstruction, road realignment, road decommissioning)

Dispersed Recreation - Timber harvest, post-harvest, and prescribed fire activities may restrict user access into a treatment unit due to safety purposes, or users may be discouraged from entering a unit due to the presence of equipment and workers. This may occur in peak summer visitations or during the fall hunting seasons. Downed trees, slash piles, loss of forest-products (i.e. mushrooms, berries), active fire and residual smoke may also discourage visitor use in an area. Noise and other disturbances may affect the quality of the recreation experience for an individual regardless of the proximity to the activity.

A change in natural features or landscape characteristics may elicit different responses in visitors. A visitor's sense of place includes attachments to external factors like natural features or landscape characteristics. Important landscape features may consist of large old growth trees and groves, variety of trees species, an open or closed tree canopy, rock formations, water bodies, and natural appearing openings. The proposed treatments such as harvesting trees, reducing slash or altering canopy cover would change or remove some of these natural features. In some cases the changing landscape would displace or discourage certain types of dispersed recreational activities (i.e. studying nature, viewing wildlife). In other areas it may encourage new dispersed recreational activities (i.e. big game hunting, photography) not available under the previous landscape.

Direct effects to recreationists accessing dispersed camps in the project area or other areas would occur on roads during haul periods. The presence of large trucks or an increased frequency of traffic may discourage road use to these sites until the road work subsides. When roads are being constructed/reconstructed visitors may expect delays or closures during work periods.

Developed Recreation - Although similar to the effects of dispersed recreation, developed recreation is more limited due to the number of sites in LJCRP. Access to developed sites may be delayed or restricted during haul periods, or road construction. The presence of large log trucks and other equipment on haul routes may discourage users from driving the main access route to developed sites or other associated

activities outside of the developed recreation area. The noise, dust, smoke and equipment activity during harvest, post-harvest and prescribed fires may affect the quality of the recreation experience for a visitor regardless of the proximity to the activity. The frequency and intensity of these activities may vary from a few hours to several weeks. Some loss or change of vistas, scenery, natural features or wildlife viewing opportunities may result with the vegetation treatments and prescribed fire activities visible from the developed sites.

Slash piles and prescribed burning would change some of the natural features and may discourage trail user activities. Noise and other disturbances may affect the quality of the recreation experience. Effects to portions of the campgrounds/trails in or adjacent to harvest units would be limited and short-term. There is a mitigation no- activity buffer of 100 ft. surrounding developed campgrounds.

Proposed road closures or decommissions would not affect developed campgrounds or trails.

Permitted Uses – All permitted uses are authorized under the term and conditions of a permit which allow activities not available to a non-permitted user. Most of these uses are tied to road access, and the removal of forest products is dependent on specific areas or vegetation. Permitted uses may be affected by project activities. Similar to dispersed recreation, timber harvest, post-harvest, and prescribed fire activities have short term effects and may restrict or discourage entry into a harvest unit. Depending on the level of treatment activity, permit users may be displaced to other areas inside or outside LJCRP.

Increased obstacles like downed trees and slash piles, or loss of forest-products (i.e. mushrooms, berries) would also change harvest patterns. Residual smoke, dust, fire, noise and equipment activity is also not conducive to a quality recreation experience. The same effects for road use described in ‘Dispersed Recreation’ are also applicable to this recreation use. If roads are used for winter haul, they may be available for access by winter recreationist like Christmas tree cutters who normally do not have access in many roads during the winter due to deep snow packs.

Long term effects of harvest and post-harvest treatments would solicit various responses from permit users. Permit holders like mushroom pickers, would find short term benefits from open, disturbed mixed-conifer forest stands, whereas berry pickers may view the loss of berry patches as a negative effect.

### *Scenery*

The following summarizes the general effects to landscape character, scenic integrity, and scenic stability common to all action alternatives in the project area:

#### **Landscape Character and Scenic Integrity**

1. No regeneration harvests would occur in the project area. Single tree selection would make up the vast majority of forest restoration treatments. Group selection treatments would make up less than 13% of treatment acres, and would create small openings less than 4 acres to support the regeneration of favored shade intolerant tree species such as ponderosa pine and western larch.
2. Enhancement of landscape character would be done by thinning and reducing dense stands of trees, providing variety in spatial distribution of plant communities and moving towards more variety in age classes. Large diameter trees would be retained within the range of variability for the potential vegetation group, and would stand out as more dominant after removing small trees around them; views into the forest would be more open. Retention of seral tree species such as ponderosa pine and western larch would be favored.
3. The proposed management activities begin the transition of moving the forest setting on a landscape scale towards the sustainable landscape character by reducing natural fuels and reintroducing the natural role of fire.

4. Utilizing existing landings, roads, fire lines and natural fuel breaks as proposed would reduce further visual impacts associated with implementation. In these areas, visual impacts are contained in areas already impacted rather than introducing new impacts.
5. Thinning treatment methods create texture changes to the existing dense to mosaic textured landscape and would blend in well.
6. On the landscape scale, by using prescribed fire in a timely manner and in phased treatments, it is expected to reduce the future risk of a potential high intensity wildfire that would affect scenic quality and stability.
7. Road maintenance would bring existing roads to a minimum maintenance standard. Numerous closed roads would be temporarily opened for commercial material access and removal and re-closed after harvest operations are complete. There would not be any new roads that would result in introducing new linear corridors in the landscape.
8. Stumps would be more evident in some areas of foreground of travel routes and dispersed sites. Coarse woody debris (slash) would be seen along travel routes before under burning, hand or machine piling, and pile burning. This would create a short term negative visual effect until the material is burned, decomposes or is softened by early successional grasses and forbs. The proposed under burning and pile burning may not entirely reduce the slash.
9. Prescribed fire has the potential to create larger forms (openings) in the landscape than intended, possibly burn out of the area intended, and/or to burn trees that are desired to be retained for scenic quality or other resource objectives.

The effects common to all action alternatives of specific forest restoration prescriptions are described in this section. All forest restoration treatment types would use the “individuals, clumps, and openings” approach which mimics stand tree patterns that would have been found historically.

#### *Single Tree Selection, Group Selection, Intermediate treatment*

Variable density thinning opens up the stands and provides greater viewing distances into the stand which is preferable. The appearance of the stands would be improved by retaining large trees, especially ponderosa pine and western larch. There would be a variation in tree spacing that retain a variety of density patterns and species compositions similar to historical conditions. The reduction of tree stocking levels would improve the resilience of the stands by reducing stress and ladder fuels, which reduces the risk of high insect and disease outbreaks, and stand replacement wildfire. These are benefits that contribute to the improvement of scenic stability when carried out at a landscape scale. Group selection would differ from single tree selection in that it would create ½ to 4 acre naturally-shaped openings to initiate new cohort of seral species (ponderosa pine and western larch). Intermediate treatment is similar to single tree selection except that it emphasizes isolating mistletoe infections and creating conditions that reduce intensification of infection.

This treatment would create stumps, slash and soil disturbance that would be visible from foreground views. These effects would be minor within the first one to two years. As regrowth of shrubs and grasses occur these effects would be significantly reduced. Single tree selection would not create openings that are visible from middleground or background distances. Small openings from group selection treatments would be consistent in size and shape with historic patterns, and could be visible from middleground or background distances. The effects of this prescription would not reduce the scenic integrity of the units.

#### *Savanna*

This treatment type would reestablish grassland/forest edges and historic grasslands that have conifer encroachment. This would enhance scenic quality by restoring open savannas toward historic conditions, and promoting the reestablishment of native understory grasses and forbs.

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*Wildlife Connectivity Corridors*

In wildlife connectivity corridors, restoration treatments would retain at least 40% canopy closure in dry forests, and 50% in moist forests. Effects would be similar to those of single tree selection, described above.

*Planned and Unplanned Fire*

Fire is used to reduce litter and ladder fuels, and restore natural ecological processes. Planned and unplanned fire will be used on up to 90,000 acres, with dry forest being the highest priority; direct effects to scenery would be usually minimal and short lived. A growing season reduces the effects to the remaining scorched tree trunks, and dead saplings. This treatment most successfully conserves scenery resources when thorough site preparation is done prior to underburning. Fire, at low intensity is a natural occurrence in this area, and its effects do not degrade the scenic quality. This treatment can greatly improve a stands resiliency to large stand replacement fire which can affect the scenic quality. Future prescribed burns, known as maintenance burns may be required in order to maintain the effectiveness of the proposed restoration treatments. These maintenance burns would be scheduled every 10 to 15 years, based on the average fire return interval in the LJCRP area. These maintenance treatments would protect the investment of an effective fuels treatment and increase the number of years before the area would need to be entered again for more extensive understory treatments.

*Stand Improvement*

This treatment reduces stocking levels within young, post disturbance stands to promote growth of desirable species and increase spatial heterogeneity toward the range of variability. Direct effects to scenery would be minimal and short term. The effects to scenery are limited to the foreground view effects of stumps, and slash. This treatment can improve stand resiliency to stand replacement fire, which can affect the scenic quality.

*Activity created fuels treatments*

Upon completion of commercial harvest activities, non-commercial material would be felled by hand crews and piled (or grapple piled), and jackpot burned to further remove ladder fuels. Low intensity prescribed burning would occur after these treatments in areas that support fire tolerant ecosystems and drier biophysical environments. The effects of this treatment is similar to the underburning of natural fuels, however the scorching and soil exposure is usually more intense. This treatment removes the small saplings and non-crop trees to increase the conditions for fire resistant trees to dominate these stands. Removing these trees improves the large tree character and opens view into the remaining stands. These effects are consistent with low intensity fire.

*Danger Tree Removal*

Danger trees would be felled and removed along all haul routes used for timber sale activity. Removing large trees would create new stumps in foreground areas of recreation sites and scenic roads, but the scale would be small and maintain scenic quality.

*Heritage*

The environmental consequences for alternatives 2 and 3 consider the application of design features and mitigation measures developed to protect the integrity of heritage resource values. Treatment activities associated with alternatives 2 and 3 will comply with Section 106 of the National Historic Preservation Act (NHPA, 1966) and the Programmatic Agreement between the Pacific Northwest Region Forest Service, the Oregon State Historic Preservation Office and the Advisory Council on Historic Preservation (on file Wallowa Whitman National Forest Supervisors Office). All sites located within or near ground

disturbing treatment units would be monitored and updated under the selection of any action alternative. Sites determined potentially eligible to the National Register of Historic Places will be avoided and protected. Known cultural sites located within non-commercial treatment units, such as pre-commercial thinning, prescribed fire, and road work will be guided by the Programmatic Agreement between R6 Forest Service and Oregon SHPO and will be evaluated for National Register eligibility.

Implementation plans will be developed for potentially eligible sites to ensure that protection measures are in place prior to ground disturbing activities. The Forest Service will also consult with tribal staff to develop consultation, management and/or protection strategies should specific concerns arise regarding potential effects to Nez Perce traditional use areas and resources.

In addition, prior to project implementation, the Forest will consult with the Nez Perce Tribe to provide additional opportunities to identify historically significance traditional use areas, or other areas of interest. If necessary, additional mitigation measures may be designed to protect cultural values or accommodate traditional uses of the LJCRP by tribal members.

### *Tribal*

Tribal issues, beliefs and attitudes regarding past, present, and reasonably foreseeable activities relative to effects to tribal values common to action alternatives will likely be the same as the issues and concerns that have already been shared by the Tribe to date. The effects to tribal values common to Alternative 2 and 3 include: uncertainty regarding the resource risk posed by the scope and scale of accelerated restoration, concerns for the conservation of old growth, inventoried roadless and riparian areas, traditional plants and traditional uses and sites. Refer to aquatic, botany, wildlife and hydrology analyses for associated treaty resource analysis.

### *Research Natural Areas*

The action alternatives will designate in perpetuity 338 acres of NFS land as the Horse Pasture Ridge Research Natural Area, and 425 acres as the Haystack Rock Research Natural Area. Once established, a management plan specific to the Horse Pasture Ridge and Haystack Rock areas will be written. Interim management of the areas will be followed as outlined in the forest plan, pages 4-84 and 4-85. The objective is to maintain the natural condition of the areas. No forest products or minerals will be removed, livestock grazing patterns will not be changed, fire activity will be limited to suppression only (unless fire is part of an approved research project), off road vehicles will be excluded, and recreation use will be managed at a low intensity level. Environmental consequences disclosed in the 1990 Forest Plan Final Environmental Impact Statement are still valid, and conditions and effects have not changed. Management strategies will not change under the establishment, and no adverse or irreversible environmental consequences are expected.

### *Lands - National Landmarks and Parklands*

There are no National Landmarks in the project area. Therefore, no impacts would occur for any National Landmark. There are no lands within the proposed project area that would be characterized as parklands; therefore, there would be no impacts on any parklands.

### *Prime Farmlands, Rangelands, and Forestlands*

The project area is not located in or adjacent to prime farmlands; therefore, there would be no impacts to prime farmlands. The project does not contain prime rangeland because of soils and climate, and none of the proposed activities in the project would convert rangelands to other uses. The rangelands within the LJCRP would likely benefit indirectly from the restoration of forested vegetation in both action alternatives. The reduction of stand densities would allow more light to the forest floor, thus increasing the abundance forbs and shrubs. Therefore, there would be no adverse impacts on prime rangelands. The

project would not convert forestlands to other uses. All lands designated as forested would be retained and managed as forested; therefore, there would be no negative impacts on prime forestland.

## Cumulative effects common to all action alternatives

For the cumulative effects analysis, the spatial context being considered is the 98,600 acre project area. Cumulative effects are discussed in terms of wildfire and vegetation management activities that have occurred since 2004 and as changes in the existing condition due to present and foreseeable activities, including the effects of the alternative being discussed. The time frame considered is approximately 10 years in the future at which time the majority of the actions proposed will have been completed and the vegetation response to these actions has occurred.

### Vegetation Management Activities and Wildfire 2004 to 2013

Table 62 lists approximate acres of the various vegetation management, fuels treatment and prescribed burning activities as well as wildfires that have occurred within the project area from 2004 to 2013.

Cultural vegetation activities that have occurred in the project area over the last ten years includes 159 acres of tree planting after harvest and 826 acres of precommercial thinning within young, post disturbance stands. Mechanical vegetation management activities have mainly consisted of tree thinning. This includes 1,320 acres with an emphasis on improving forest structure, health and growth and 113 acres of uneven-aged management thinning of all age classes and establishment of a new cohort.

Fuels treatments that have been accomplished in association with mechanical treatments included 179 acres of thinning for hazardous fuels reduction, as well 583 acres of treatments with a primary focus of rearrange and reduce activities generated fuels (slash lopping, crushing, piling and jackpot burning) and 636 acres of pile burning.

Prescribed burns have been implemented on 868 acres to improve wildlife habitat, reduce natural fuels accumulations, and reintroduce fire to fire adapted ecosystems.

Wildfires from 2004 to 2013 have burned on approximately 23,752 acres of the project area. These fires all burned within the same vicinity on the eastside of the project area and have substantial overlap between them. Of the acres burned, it is estimated that the overall average burn severity to the forested vegetation was 20 percent high severity, 60 percent mixed severity and 20 percent low severity. There is wide variability among these percentages from fire to fire due to these fires burning the same area multiple times.

**Table 62. 2004 to 2013 – Approximate acres of vegetation management activities and wildfire in the Lower Joseph Creek Restoration Project area**

Treatment	Treatment Type	Approximate Acres
Cultural	Tree Planting	159
	Precommercial Thin	826
<b>Total Cultural:</b>		<b>985</b>
Mechanical Vegetation Management	Commercial Thin	1,320
	Single-tree Selection Cut (UA/RH/FH)	36
	Group Selection Cut (UA/RH/FH)	77
	Sanitation Cut	3
<b>Total Mechanical:</b>		<b>1,436</b>
Fuels Treatments	Thinning for Hazardous Fuels Reduction	179

Treatment	Treatment Type	Approximate Acres
	Yarding - Removal of Fuels by Carrying or Dragging	86
	Piling of Fuels, Hand or Machine	460
	Rearrangement of Fuels	37
	Burning of Piled Material	636
<b>Total Fuels Treatments:</b>		<b>1,398</b>
Prescribed Burn	Broadcast Burn (Majority of Unit) - Wildlife Habitat	592
	Underburn (Majority of Unit) - Low Intensity	276
<b>Total Prescribed Burn:</b>		<b>868</b>
Wildfire	Jim Creek - 2006	360
	Cottonwood - 2007	8,439
	Cache Creek - 2012	14,953
<b>Total Wildfire:</b>		<b>23,752</b>

The following is a discussion of effects of these past management activities and wildfires in terms of the analysis metrics specific to the vegetation resource.

**Forest Cover Type** – Planting activities increased occurrence of ponderosa pine and western larch within understocked areas. Thinning treatments favored ponderosa pine and western larch and discriminated against grand fir. Prescribed burning and wildfires also favored fire resistant tree species.

**Forest Structural Stages** - Thinning treatments generally retained old and large trees. Sanitation treatments may have removed some old forest structure. Prescribed burning and low severity wildfire resulted in periodic tree mortality of susceptible old trees. Mixed and high severity wildfire killed a large proportion of the old forest structure and increased acres within the stand initiation structural stage.

**Tree Density Class** - Thinning treatments resulted in forest density within the low to moderate density classes. This in turn had a beneficial effect of improved forest growth. Prescribed fire and low severity wildfire also led to localized reduction of forest density.

**Pattern** - The thinning treatments resulted in some irregular tree spacing. These treatments were incidental to reestablishing forest openings and attaining a mosaic of interspaces and tree clumps of varying sized and shapes. Mixed severity wildfires resulted in a mosaic of tree mortality and a pattern with indiscriminate interspaces and tree clumps. The remaining treatments and low severity wildfire resulted in some irregular tree spacing and clumping.

**Size Class Distribution** – Thinning treatments, prescribed fire and low severity wildfire generally favored larger trees and removed trees in the smaller size classes. This resulted in a size class distribution emphasis toward larger tree size classes. Moderate and high severity wildfire removed trees among all size classes.

**Insects and Disease** – Susceptibility was reduced in the thinning and prescribed burning treatments and low severity wildfire by enhancing stand conditions that are conducive to improved forest health (trending toward RV). Thinning treatments also removed dwarf mistletoe infected trees reducing the percent of trees infected as well as creating conditions that slowed or inhibited mistletoe spread. Prescribed fire and low severity wildfire also led to localized reduction of forest density and dwarf mistletoe infection.

## Rangelands and understory vegetation

Cumulative effects to rangelands include a temporary increase in forage from mechanical forest thinning, fuels treatments, and prescribed burning. Wildfires can increase forage in locations where they were low

to moderate intensity. In forested range, high intensity fire generally reduces understory vegetation for a number of years (FEIS 2014). Bluebunch wheatgrass generally regains pre-fire cover the year after it burns. Idaho fescue can take a few years to regain prefire cover, but other components of Idaho fescue communities recover in the first year after burning (Johnson 2005).

Wildfire and project activities have the greatest chance for cumulative effects on non-native plants within the LJCRP area, but predicting wildfire occurrence is problematic. Large scale and intense wildfire disturbance would create ideal areas for the introduction and spread of non-native plants. With increasing numbers of wildfires the numbers of non-native species could increase (Merriam et al. 2006), with the largest increases found in those areas with pre-existing non-native plant populations. One benefit of this project is the decrease of current fuel loading and therefore the risks of uncontrolled wildfire, so future large-scale burns should be reduced.

Of the activities with predictable timetables, this project coupled with roads, grazing, and timber harvest have the highest possibility of cumulative effects within LJCRP. Roads are a vector of weed spread and transport, thus unregulated road use, construction of temporary roads, and re-opening of previously closed roads increases the risk. Grazing could also increase the risk of spread and introduction of non-native species. Livestock are vectors of plant material and can transport seeds and other plant reproductive material over distances. The possible increase in the number of non-natives due to project activities coupled with transport by livestock could increase the risk for areas outside of the actual project and treatment area boundaries (Merriam et al. 2006). These impacts along with timber harvest disturbance; log landings, skid trails, etc.; could compound the situation for invasive plants. These disturbed areas are likely sites of invasive plant infestations and surveys of completed timber sales, restoration of disturbed areas, and treatment of infestations would reduce the overall risk of establishment and spread of invasive plants.

## TES Plants

Prescribed fire, thinning, grazing are activities that have occurred and will likely occur in the foreseeable future. Wildfire is possible and has occurred in the past 30 years. Grazing is the most likely ongoing activity that could complicate restoration efforts, especially in dry open forest habitats, where palatable browse and grass is most accessible. Pasture condition should be assessed by the district range specialist and the district botanist after restoration treatments occur and prior to putting livestock out to graze. Premature use of treated pastures can lead to increased bare soil, erosion, decreases in native bunchgrasses and increases in invasive annual grasses. Moist and wet meadows, riparian areas, springs and seeps may be more exposed after logging, thinning and/or prescribed fire, making them more vulnerable to use by both wild and domestic ungulates. Many of the springs in the project area have been converted to ponds, or diverted to troughs, locally drying soil and making water less available to vegetation. Lithosols are subject to off-road vehicle use, livestock use, as well as parking areas, and sites for piling and yarding. Given that LJCRP project design criteria are followed, cumulative effects May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing or Cause A Loss Of Viability To The Population Or Species (MIIH) in LJCRP.

## Aquatic habitat

Past management activities in the LJCRP are summarized in Tables 62 and 63. Potential impacts from these activities on aquatic habitat have likely abated. Impacts from road construction and reconstruction are discussed separately.

**Table 63. Status of forest management projects in the Lower Joseph Creek Restoration Project Area aside from forest vegetation management.**

Action or Activity (Year of NEPA Decision)	Treatment	Status
Range Management		
15 Livestock Allotments	Domestic grazing	Ongoing
Recreation and Public Uses		
Designated Campgrounds	Camping, recreational driving, hunting, collecting forest products	Ongoing
Regulation of Hunting Seasons	ODFW regulation of tags for the big game management units	Ongoing
Dispersed Camping	Camping, gathering firewood, recreational driving, and collecting forest products	Ongoing
Other Resources		
Noxious Weed Treatment	Treating new sites of noxious weed patches as approved by the W-W Invasive Species EIS.	Decision signed, implementation pending litigation
Transportation		
Road Maintenance	Grade roads 4600, 4602, 4605, 4615, 4650, 4655, 4680,. Clean culverts and ditches on all roads as needed	Ongoing

The analysis area for aquatic resources for the LJCRP includes portions 15 livestock grazing allotments. Bank alteration, browsing of shrubs and high fine sediment levels along creeks within the active allotments are being addressed by improved management and administration of the grazing that occurs in riparian areas. The majority of stream reaches within the allotments are inaccessible to livestock due to steep terrain. Condition of aquatic and riparian habitats should improve as a result of these improvements in management. Increased monitoring will be occurring to document whether the expected changes occur.

Noxious weed treatment is an ongoing project that occurs within all project area subwatersheds. These treatments were determined to either have No Effect or to May Affect, Not Likely to Adversely Affect Snake River steelhead. Consultation with NOAA Fisheries has been completed for the May Affect, Not Likely to Adversely Affect determinations.

Currently we are not treating noxious weeds with chemicals except in court approved locations (see Affected Environment, Non-native invasive plants section, above). Mitigation measures that include type of chemical treatments, application rates, area treated, timing, and buffers on streams significantly reduce the risk of effects from this activity. However, the overall risk of adverse aggregate effects due to noxious

weed treatment is rated moderate because they are not completely controllable, and need to be administered.

A limited amount of dispersed camping occurs in this area, but due to the relatively steep topography and limited camping along perennial streams, this activity is rated as having a low risk of cumulative effects on aquatic resources, listed fish or their habitat.

There are two developed campgrounds in the LJCRP area: Coyote and Dougherty. Both have limited use during hunting season and season camping during the summer. This activity is rated as having a low risk of cumulative effects on aquatic resources, listed fish or their habitat.

Regularly scheduled road maintenance occurs every one to seven years depending on the condition of the road, the assigned maintenance level, and the maintenance priority. Other scheduled maintenance activities occur as specific needs are identified. Maintenance levels for roads are determined by the road management objectives, the intended use, operational requirements, and budget levels. Maintenance activities occur primarily from late April to late November depending on the actual condition of the road and moisture level. Maintenance levels are summarized in the following paragraphs.

Four types of road surface occur in the LJCRP area: (1) native (dirt surface), (2) improved (pit-run surface, spot-rocked), (3) aggregate (crushed rock surface), and (4) asphalt concrete pavement. The surface types vary for each maintenance level of road depending on the long-term objectives for the road.

Road maintenance practices can vary to provide additional protection to soil and water resources. Seeding of closed roads and low-use roads may be intensified. Keeping maintenance equipment away from streams and wet areas and limiting the number of stream crossings may be emphasized to protect soil and water resources. The use of pit-run (3- to 6-inch) rock on roadbeds may be used to increase protection from erosion. Emergency repair of roads may occur after natural disasters such as flash floods or unusually high spring runoff for all maintenance levels.

The short-term effects from all of the transportation activities will be minimized through protection measures, such as instream work windows, operating under dry conditions, etc.). In the long-term, this project will protect and improve existing habitat. The overall risk of adverse aggregate effects for transportation activities in the short term is rated moderate. The overall risk of adverse aggregate effects for transportation activities in the long term is rated positive.

There are 6 culverts proposed for replacement within the LJCRP area. These culvert replacements are proposed to eliminate migration barriers to juvenile fish and to allow passage of 100-year flows. These projects were given a likely to adversely effect determination in the consultation with NOAA Fisheries due to the short-term possibility of sediment input to streams. In the long term, however, these projects are expected to have a positive effect on listed fish species and habitat. They are given a moderate risk of adverse cumulative effects due to potential short-term impacts. Culvert replacement would be covered under the Aquatic Restoration Biological Opinion II (ARBO II) for Section 7 Consultation (Service 2013).

Collection of fuelwood, Christmas trees, saw logs and house logs (up to three truck loads per permit), and posts and poles are permitted only in Management Areas 1, 3, 6, 10, and 11. Harvest of these products is not permitted in administratively prohibited areas such as developed campgrounds or within 100 feet of wet areas, seeps springs, bogs, and standing or flowing water. No trees are permitted to be cut within 300 feet of perennial fish-bearing streams. Compliance with these regulations is monitored by USFS Special Forest Product Coordinators and Law Enforcement Officers. These activities are given a low risk rating for cumulative adverse effects to listed fish species.

Timber production and livestock grazing are the primary land use activities occurring on private lands adjacent to the project area. Logging operations on private timber lands are required to follow Oregon's Forest Practices Act and are monitored for compliance by Oregon Department of Forestry. Private lands adjacent to the south and west boundaries of the project area have recently been logged. It is assumed that logging was conducted in accordance with the Oregon Forest Practices Act and therefore impacts to aquatic habitat were successfully mitigated.

Activities, such as roads and timber harvest, on private lands that are likely to result in cumulative effects with activities proposed under LJCRP are assumed to be limited. Road densities on private lands in the LJCRP area exceed the NOAA Fisheries threshold. Both values would be rated as functioning at unacceptable risk using NOAA Fisheries Matrix thresholds.

#### *Cumulative Effects Summary for aquatic habitat*

Past and current management activities have had and are having impacts to aquatic habitat and aquatic species (including Snake River steelhead and redband trout) in the LJCRP aquatic analysis area. These impacts have resulted in a decline in aquatic and riparian habitats in the analysis area. Water temperatures and fine sediment levels in the project area are likely higher today than prior to European settlement. Current activities (including livestock grazing) on Forest Service lands are managed under the standards and guidelines of PACFISH which were developed to speed the recovery of riparian and aquatic habitats. The majority of streams in the project area are assumed to be recovering from past degraded conditions. However, fine sediment levels are elevated in the LJCRP area. Grazing and roads are the two major management activities in the analysis area contributing to fine sediment effects.

#### **Wildlife**

The list of past, present and foreseeable actions was reviewed to determine potential effects to dead and defective wood habitat. The only actions which would contribute to potential cumulative effects include hazard tree removal and firewood gathering. There are no other vegetation projects planned in the project area for the foreseeable future. Cumulative effects of the proposed project and the potential for hazard tree removal and firewood gathering have the potential to impact habitat and may increase risks to dead and defective wood habitat. This increased risk to loss of snags is of most concern in the EMC habitat type (Moist Forest PVG).

Together with other landscape objectives that limit or discourage large fires and insect outbreaks, the project would contribute to a negative trend in dead and defective wood habitat across the project area. It is unknown how the prescriptions using the ICO (individual, clumps, and openings) approach may affect the future development of snags. In the 'clumps' which are left unharvested, natural snag creating mechanism such as density will remain and snags will continue to develop in both the short and long-term. However, in areas that are thinned 'individuals', snag creating mechanisms may be removed, thus at least in the short-term, natural snag creation may be happen less often than in the current more dense stands.

This project would temporarily increase road density in the analysis area by constructing 12.6 miles of temporary roads and reopen 60 miles (maintenance level 1 system roads), and post-project road densities in some subwatersheds would remain above Forest standards. Additionally of concern within the analysis area is the unregulated OHV and full-sized vehicle use of closed roads which has been shown to negatively affect elk and elk habitat.

The reduction in connective habitat quality that results from silvicultural treatments will be relatively short lived as tree canopies respond to the reduced competition and seedlings establish in response to increased sunlight reaching the forest floor. The quality of connective habitat in treatment units would likely recover to within desired conditions within fifteen years. In the interim, the network of

connectivity corridors that is not being treated, including many riparian areas, MA15 areas, and the matrix of forested habitats will facilitate movement of LOS associated wildlife species between source habitat patches. The incremental effects of prescribed burning, non-commercial thinning, and mechanical fuels reduction, would not compromise the quality or function of connective corridors.

Past timber sales, fires, roads, and prescribed burns have modified and converted Neotropical migratory bird species (NTMBS) habitat in the analysis area. Past logging has led to the reduction of large trees in the area due to selective harvesting, and was likely detrimental to species that depended on contiguous conifer cover and avoided forest edges, but favored species that utilize dense shrubs and early seral forest habitat. Fire suppression has interrupted historic fire return intervals at the broadscale. Consequently, many stands are now overstocked with young trees and are vulnerable to insects, disease, and wildfire. Roads, within the north and south portions of the analysis area, built to facilitate timber operations has had a long-term impact on the area and continues to provide access for recreationists, hunters, woodcutters, and others. This project should not contribute to negative cumulative effects because project treatments would begin to shift the project area towards the overall long-term goal of moving toward RV for tree size, tree species, and canopy closure.

Burning plans are designed to maximize retention and protection of large diameter live trees, snags, and logs, and there would be no increase in open road density. A mosaic of forest and rangeland conditions capable of supporting breeding NTMBS populations would exist if either action alternative is implemented.

There is no indication that habitat changes from the project would result in reduced numbers of any particular NTMBS that would be meaningful at local or landscape scales. Grazing is an ongoing activity in the project area, but is not causing any cumulative effects because it does not change the density or distribution of live trees, snags, or down wood, or increase open road density. While grazing does not affect forest canopies, shrub and grass habitats can be altered by vegetation removal which leads to reduced structural diversity. A simplification of the vegetation likely causes a shift to generalist species (Knopf 1996). Grazing should not affect NTMBS shrub or grass habitat because grazing according to forest plan standards leaves adequate shrub and grass cover, and is designed to allow for normal recovery rates that do not delay regeneration. There are no reasonably foreseeable future activities that may impact NTMBS or their habitat in the project area.

## Climate change

Climate change effects are a component of cumulative impacts. Changes in climate influence vegetation, water, and disturbance frequencies; and these changes, in turn, influence one another. A change in one aspect causes a cascade of responses that, in some cases, counteract and, in others, magnify the initial change. Such interactions make prediction of the likely effects of climate change difficult at the scale of the LJCRP analysis area even if the nature of the climate change were known. For now, it is certain that changes will occur at a continental scale; however, how climate change impacts local landscapes is not well understood. Until the environmental responses are better understood, it will be difficult to predict with accuracy the environmental outcomes of particular land-use activities. Species most at risk of climate change are those with small geographic ranges (e.g., local endemics), narrow physiological tolerances, limited dispersal abilities, narrow habitat associations, strong interspecific dependencies, low genetic diversity, and those that have recently experienced population declines. Tools to predict the potential climatic changes as influenced by the LJCRP activities over the next 10 to 15 years have yet to be devised, but it seems unlikely that measurable changes will occur relative to this species (potential temperature and precipitation increases being the most likely climatic change in this part of the continent) over the short life of this planning document (Yates, 2012).

Global climate change has the potential to have impacts to aquatic habitat through increases in water temperature and changes in streamflows in response to changes in climates<sup>16</sup>. Long-term changes to aquatic habitat in the analysis area may occur as a result of global climate. These changes may include:

- Increases in water temperatures in response to increases in air temperature,
- Changes in runoff patterns in response to an increase in the amount of winter precipitation that falls as rain:
  - Decreases in summer streamflows in response to a reduction in snowpack.
  - Reduced duration of spring runoff but higher peak flows due to an increase the amount of winter precipitation that falls as rain

Activities proposed under Alternatives 2 and 3 are unlikely to have measureable cumulative effects with global climate change because:

1. The proposed thinning activities are unlikely to result in a change in runoff patterns because a significant decrease in forested cover would not occur.
2. Potential increases in water temperature as a result of proposed burning are unlikely to occur in the analysis area and if increases do occur they are unlikely to be measureable.

## Recreation

Past projects and actions which have affected recreation uses include timber harvest, road construction, and recreation uses and have been incorporated into the existing condition for this project. This project in combination with current projects have a slight potential to influence dispersed recreation activities by displacing big game hunters, berry pickers, open areas for viewing scenery, and other recreational uses both during implementation and in the longer-term, post implementation.

## Scenery

The geographic boundary for this cumulative effects analysis is the LJCRP area and the temporal boundary is approximately 10 years, the amount of time needed for evidence of logging, restoration activities associated with road management and ecological function to soften and blend into the landscape more completely.

Vegetation management has occurred in the past in the LJCRP area, there have been numerous timber sales, fuels reduction treatments, and activities associated with hazard tree removal in developed campgrounds and along travel routes. Rooding, timber harvest and recreation development have changed the landscape from a natural appearing forested landscape.

The activities of past management activities in total combine to maintain a range of scenic integrity levels from high to low in the designated viewsheds.

Vegetation management will continue to occur as routine hazard tree removal in developed recreation sites and along travel routes. A sustainable forest would be promoted, the larger diameter trees (>20") would be retained and become more healthy as competition from other vegetation species would be reduced. The large trees would have more nutrients, water, and space for growing and would be visually enhanced for viewing along the travel routes. The landscape character will be scenically and ecologically improved as the vegetation patterns become more diverse as a more complex forest structure is

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<sup>16</sup> For more information developed by the Forest Service to highlight potential impacts to aquatic habitat in the Pacific Northwest, see <http://www.fs.fed.us/ccrc/topics/salmon-trout.shtml>

established and old growth characteristics become more dominant. Overall, the trend is that scenic natural appearing landscapes will be more desirable over time in the forested setting.

## Heritage

Overall, the cumulative effects on heritage resources as a result of alternatives are not considered to be adverse due to compliance with the Programmatic Agreement between the R6 Forest Service and the Oregon State Historic Preservation Office (2004), design criteria and mitigation. The cumulative effects on cultural resources resulting from any potential increase in erosion resulting from restoration activities, or inadvertent damage by mechanical treatment, are not likely to be adverse. Reducing fuel loads and implementing low to moderate intensity prescribed fires would not cause soil sterilization or hydrophobic soils as compared to high-intensity wildfires. As noted previously, low-intensity prescribed fires leave some vegetation in place and revegetation occurs soon afterwards if soils are not sterilized. However, as implementation occurs, archaeologists would monitor for erosion concerns examining sites in the project areas, focused on slopes, drainages, and other high probability areas with cultural resources present. The potential cumulative effects to cultural resources caused by an increase in erosion are not considered to be adverse. High intensity wildland fire could destroy the non-renewable values associated with both historic and pre-contact heritage resources.

## Tribal

Prescribed fire, thinning, dispersed recreation, grazing, timber harvest, wildfire and the exercise of treaty rights have and will continue to occur into the foreseeable future. Although tribal members are concerned about the risk of the pace and scale of accelerated restoration, ecological objectives, as identified in the purpose and need, will likely counter adverse effects to tribal values.

See cumulative effects common to all action alternatives for plants, aquatic habitat, wildlife habitat, climate change and scenery resources.

## Past, Present, and Reasonably Foreseeable Activities Relevant to Cumulative Effects Analysis

Prescribed fire, thinning, grazing are activities that have occurred and will likely occur in the foreseeable future. Wildfire is possible and has occurred in the past 30 years. Grazing is most likely to complicate restoration efforts, especially in dry open forest habitats, where palatable browse and grass is most accessible.

The 2005 Travel Management Rule requires every National Forest to complete a Motorized Vehicle Use Map (MVUM). In August 2014, the Wallowa-Whitman National Forest released existing condition road maps to the public for review. The forest plans to use the updated existing condition road and motorized trail maps as the starting point to begin the official public planning process to be in compliance with the 2005 Travel Management Rule. The WWNF effort will include public involvement and official comment periods, in order to help the Forest identify a designated system of roads, trails, and areas for public motorized vehicle use on the WWNF. Once the travel management planning effort is complete, the network of designated roads, trails, and areas will be displayed on a MVUM. This planning will cover the LJCRP area, and may result in travel management actions in addition to, and/or different from those proposed by the LJCRP.

The WWNF is in the process of completing an Invasive Plants Treatment Plan FEIS. Alternative 2 of that FEIS was the selected alternative, which uses integrated manual, mechanical, herbicide, and cultural treatments on approximately 22,840 acres of mapped infestations, as well as on sites that may be detected in the future. Treatments would be completed following steps outlined in the Annual Implementation Planning process and Common Control Measures, according to Project Design Features and Herbicide Use Buffers that limit the extent and method of treatment appropriate to site conditions. In addition to

these steps, the Early Detection, Rapid Response Decision Process would be followed for sites that may be detected in the future.

In 2005, the Pacific Northwest Regional Forester amended all Forest Plans in Region 6, adding new management direction, including an emphasis on early detection, and effective integrated treatment of invasive plants. The purpose of the Invasive Plants Treatment Plan EIS is to bring the treatment program on the Forest into compliance with the new standards, and allow for effective treatments on all sites currently mapped and those that may be detected in the future. Initial treatments will rely more heavily on herbicides; but the goal of this project as invasive plant objectives are met, is to reduce the use of herbicides over time.

Invasive plants are a threat to aquatic and riparian habitats due to their negative effects to native ecosystems. Currently, invasive plant infestations are limited in extent in the LJCRP area (see invasive plants specialist's report). Infestations are mainly located in RHCAs, travel corridors (i.e. roads). Treatment of invasive plants infestations along roads will be treated as part of the prevention strategy for the LJCRP. Impacts to aquatic and riparian habitats and aquatic species may result in short-term adverse impacts but will improve riparian conditions in the long-term.

### Short-term uses/long-term productivity (Neil)

Short-term effects of tree removal and prescribed burning will reduce inter-tree competition and free up growing space for residual trees and understory vegetation. Under all action alternatives, the proposed actions and associated design features would not affect long-term productivity of forest vegetation and timber resources.

### Unavoidable adverse effects (Neil)

There are no unavoidable adverse effects related to forest vegetation and timber resources.

### Irreversible/Irretrievable commitments of resources (Neil)

Under all alternatives, the proposed actions and associated design features would not involve or invoke irreversible and irretrievable commitments of forest vegetation and timber resources.

## Comparison of Alternatives

Table 64 compares the effects of the alternatives.

**Table 64. Comparison of the relative effects of the alternatives**

Criteria	Metric	Alternative 1 (No Action)	Alternative 2 (Modified PA)	Alternative 3
Total forest treatments	<i>Acres</i>	0	22,119	12,778
RHCA treatment	<i>Acres</i>	0	2,571	749
Cat 1 RHCA treatments	<i>Acres</i>	0	58	0
Cat 4 RHCA treatments	<i>Acres</i>	0	1,822	0

Criteria	Metric	Alternative 1 (No Action)	Alternative 2 (Modified PA)	Alternative 3
SI RHCA treatments	<i>Acres</i>	0	749	749
Forest treatments in IRAs	<i>Acres</i>	0	5,488	0
Roads in RHCAs - Lower Joseph	<i>Miles</i>	17.3	15.7	16
Roads in RHCAs - Upper Joseph	<i>Miles</i>	38.2	38	38
Riparian Management Objectives	<i>Qualitative category</i>	Outside the acceptable range	Meet RMOs over long-term	Between Alts 1 and 2
Total open USFS roads	<i>Miles</i>	219	198	221
Total stream crossings Lower Joseph Creek	<i>Miles</i>	205	187	189
Total stream crossings Upper Joseph Creek	<i>Miles</i>	280	277	277
Total closed USFS roads	<i>Miles</i>	93	128	98
Total road density Lower Joseph	<i>Miles/Sq Mile</i>	1.30	1.10	1.20
Total road density Upper Joseph	<i>Miles/Sq Mile</i>	1.10	1.10	1.50
Temporary road construction	<i>Miles</i>	0	12.6	12.6
Open road density <sup>17</sup> – Broady Creek (MA1)	<i>Miles/Sq Mile</i>	1.6	1.6	2.7
Open road density – Cougar Creek (MA1)	<i>Miles/Sq Mile</i>	3.7	3.2	3.5
Open road density – Lower Swamp Creek (MA1)	<i>Miles/Sq Mile</i>	2.7	2.7	3.0
Open road density – Sumac Creek (MA1)	<i>Miles/Sq Mile</i>	3.6	2.8	4.0
Aquatic organism passage improvements	<i># culverts</i>	0	6	6
Road reconstruction	<i>Miles</i>	0	82.6	82.6
Increase in forage production as a result of forest thinning	% of treated acres in allotments	0	17	10
Vegetation pattern (% of forest treated with ICO)	%	0	25	18
Landscape Resiliency – fire frequency and extent (HRV = 6-15% burns/year)	% of project area	<2% of landscape burns/year (unplanned ignitions); 15-20% burns at once in high fire years	4-6% of landscape burns/year (planned + unplanned); 5-10% burns at once in high fire yrs	4-6% of landscape burns/year (planned + unplanned); 15-25% burns at once in high fire yrs
Native plant diversity (Based on the chance of encountering the same plant species in consecutive samples)	<i>Shannon-Wiener index</i>	3.9 to 4.4 depending on habitat	Greater than Alt 1	Greater than Alt 1

<sup>17</sup> The six subwatersheds not listed here do not differ in seasonal open road density.

Criteria	Metric	Alternative 1 (No Action)	Alternative 2 (Modified PA)	Alternative 3
Jobs	#	0	55	34
Timber volume removed	<i>million cubic feet</i>	0	10.4	6.6
Heritage (Relative risk to conservation of heritage sites as measured by the area of mechanical treatments in high to moderate-low probability heritage site areas)	<i>Acres</i>	0	5,100	2,603

## Alternative 1: Direct and Indirect Effects

### The physical environment

#### Climate

Relative comparisons of the degree of climate change adaptation between alternatives are based on evaluation of one or more of the following indicators:

- Acres available for planting (even-aged harvest) and providing opportunities to adapt tree species composition to changing climates
- Acres of designated wildlife corridors, which can reduce barriers to movement
- Acres of thinning to restore disturbance regimes and/or reduce uncharacteristically severe wildland fires
- Miles of roads with improved drainage and reduced sediment delivery, thus reducing hydrologic connectivity of the road system
- Miles of riparian restoration, which restores floodplain connectivity, flow regimes, and/or increases effective stream shade
- Acres of invasive plants treated

No management activities would be implemented under alternative 1; hence, no improvement in climate change adaptation would occur.

#### Physical Environment

There would be no direct effects to soil productivity or water quality in the analysis area with Alternative 1. In the absence of active timber management, soil productivity in former timber sale units would continue to improve over the course of 20-50 years (Tano et al, 2005).

Compaction and displacement would be ameliorated over time through natural restoration processes such as freeze/thaw, tree root expansion, ground cover root mass expansion, and organic matter, leaf, and litter layer development. Compaction, erosion and water quality related effects associated with livestock management across the LJCRP analysis area have improved over the last couple decades. These improvements are results of restoration activities, and evolving range management practices. However, grazing continues and will continue to impede the recovery of soils and water resources. Though the action alternatives will not modify the allotment management plans, they produce the secondary benefit of improving forage in the

uplands which may reduce grazing pressure in the more sensitive lowlands. This potential benefit would not occur under the no action alternative.

Under the no action alternative, no additional roads will be decommissioned. Therefore the direct deleterious effects of active road decommissioning would occur (see Alternative 2 Effect for detailed discussion on direct effects of road decommissioning). However, these roads would remain on the landscape and continue to fragment habitat, interrupt aquatic connectivity, lengthen streams, persist as a source of sediment and contribute to detrimental soils conditions.

Fuel loads, however, will continue to increase and subsequently increase the risk of uncharacteristic wildfire intensity. Potential wildfire effects on physical environment would depend upon the intensity, duration and extent of the fire. Soil recovery depends on post-fire organic content and erodibility, slope, and the speed with which groundcover is re-established. A stand replacing wildfire with high temperatures, long flame lengths, and long residence times could consume litter and duff and reduce effective groundcover. A loss of groundcover could lead to indirect effects such as reduced site productivity (nutrient loss through erosion), increased sediment production (sheet and rill erosion), and reduced water quality (Landsberg and Tiedemann 2000).

In the absence of proactive management, fuel loads would be high and would raise the risk of uncharacteristic wildfire intensity. The potential for epidemic insect and disease damage would also be greater than if the forest were thinned, which also raises the risk of wildfire intensity. A high intensity wildfire in the area could lead to indirect effects such as elevated stream temperatures and increased stream sediment for approximately 5 to 10 years (Dunham 2007) (Charles C. Rhoades 2011).

### *Air*

There would be no direct effects to air quality under Alternative 1.

In the absence of harvest, SI, and prescribed fire, forest vegetation and fuel loading would continue to depart from reference conditions and associated disturbance would continue to operate outside characteristic severity levels. Seasonal wildfire would continue to occur with the potential to become larger and more severe. Large fires have the potential to produce more smoke than prescribed fire in a shorter time period. The presence of smoke has the potential to impact air quality, visibility, communities, and human health. The duration of smoke impacts from wildfire could last from days to months depending on the fuels affected and duration of active fire and would likely have greater effect than from prescribed burning.

## **The biological environment**

### **Vegetation and disturbance regimes**

In the short term, the distribution of forest cover type, forest structural stages and tree density class under alternative 1 would be expected to be similar to existing conditions (see tables in affected environment section). The following is a narrative discussion of change over time based on the current trajectory.

#### *Forest Cover Type*

In the short term, western larch in the dry PVG and ponderosa pine in the moist PVG would remain within the desired range. All other cover types in the dry and moist PVGs would be outside RV percentages. Conditions would continue to favor Douglas-fir and grand fir. Seral

species (ponderosa pine and western larch) would continue to stagnant and decline moving farther outside RV.

### *Forest Structural Stages*

The dry PVG stand initiation and stem exclusion structural stages would remain within RV percentages. All other dry PVG and all moist PVG structural stages would be outside the desired range. Successional pathways from stand initiation to old forest would continue. Tree growth would slow in areas of high stocking. Forest structure will continue to be outside of RV and favor multi-storied conditions.

### *Tree Density Class*

Within the moist PVG, the moderate and low density classes would remain within the desired range in the short term. The percent of the landscape in the moist high and all density classes in the dry PVG would be outside of the RV. Overstocked conditions would continue. Tree growth would continue to slow and density related mortality would increase. Moderate and high density classes would increase as the low density classes transition to moderate, and moderate shift to high, further moving away from the desired RV percentages.

### *Pattern*

In the absence of cutting, pattern would continue to favor continuous tree crowns with small canopy gaps associated with insect and disease pockets. Forest canopy would continue to increase, shading out understory herbaceous vegetation and further reducing forage production and species diversity. Historic grasslands, savannas and forest openings would continue to become smaller.

### *Size Class Distribution*

The forested landscape would remain dominated by trees in the 10 to 20 inch size classes. Trees would continue to grow toward the next higher size class. Individual tree growth would slow and where overstocked conditions occur, movement from one class to the next would be inhibited.

### *Disturbance and fire regime*

There would be no direct effects to disturbance regimes or fire severity under Alternative 1.

Fire suppression has been and would continue to be implemented in the LJCRP area under Alternative 1. Given current and expected fire suppression activities less than 2% of the LJCRP landscape is affected by fire on average per year. On modeled high fire years approximately 15 – 20 percent burns at once. The historical range of acres affected by fire in any given year is approximately 6 – 15 percent.

In the absence of forest restoration treatment and utilization of unplanned ignitions to increase the decision space for fire management, the conditions described in the affected environment would continue to depart from desired conditions. The landscape would continue to become less resilient to disturbance (including changing climate). Disturbance regimes would continue to shift from relatively frequent low/mixed severity disturbance towards relatively infrequent moderate/high severity. The landscape would continue to homogenize in density and structure creating a more continuous fuel environment that has the potential to support larger more intense disturbance effects. The shift from fire tolerant to intolerant species and fire suppression could create conditions that select against regeneration of early seral fire tolerant species (a key ecosystem component) at the scale of the project.

In the event of a large high severity fire occurring in the LJCRP following the increase in fuel accumulation, insect mortality, and shift from early to late seral species there is the potential to affect many ecosystem components including existing early seral old trees and wildlife habitat features.

Alternative 1 does not meet the purpose and need of the project because there would be no restoration of structure, density, composition or pattern, thus no restoration of disturbance processes at the landscape scale. Disturbances will continue to increase in severity and potentially size depending on conditions (fire weather) under which they occur.

### **Fire Management Decision Space**

Alternative 1 would not reduce the ecological or political risk of utilizing unplanned ignitions to meet landscape restoration goals. Selection of this alternative would not improve fire management decisions as a result of restoration activities that are designed to more closely resemble natural fire regimes and effects.

### **Insects and Disease**

Insect and diseases that thrive in overstocked, stem exclusion or understory reinitiation structural stages and with host species of Douglas-fir and grand fir would increase. Susceptibility of ponderosa pine and western larch would increase as conditions favoring these species deteriorate and they become more stressed.

Dwarf mistletoe and degree of mistletoe infestation - Without the removal of infected trees, reduction of host trees, or creation of conditions that minimizes potential for spread to uninfected trees, it is expected that existing dwarf mistletoe infections would intensify and spread.

### ***Timber Resource***

There would be no harvest treatment (0 acres treated that remove timber volume) and there would be no timber volume (0 cubic feet) removed as a result of restoration treatments.

### ***Rangelands and understory vegetation***

There are no known direct, indirect or cumulative effects on range resources because of the No Action Alternative. Effects related to this alternative on range resources are primarily indirect in nature. Rangeland condition, livestock distribution, forage available for utilization and improvements will remain unchanged and consistent with existing management. Changes in livestock distribution through enhancement of transitory range will not occur.

### ***Non-native invasive plants***

Under the no action alternative, there would be no essentially no change in the threat of invasive plant increase and spread compared with the current situation. Currently, invasive plants increase and spread through ongoing land management activities and permitted actions, recreational users, and wildlife. Known invasive plant sites within the planning area are currently managed under an integrated management system. Documented (and NEPA approved) sites would continue to be treated based upon their current priority and status.

Invasive plant spread is primarily related to factors of seed transfer and new potential habitat in areas of freshly disturbed soil, and changed site conditions. Therefore, invasive plant abundance is expected to increase as the number of forest users increases. Potential invasive plant spread from other vectors (livestock, wildlife, human activities, wind) would continue.

The overall effects of the no action alternative in regard to invasive plant increase and spread are essentially the same as the current baseline situation. Since this alternative would result in no new disturbance from logging, road work, or burning, Alternative 1 (No action) has the least risk of increasing or spreading invasive plants in the project area.

Because no new management activities would occur under the no action alternative, there will be no cumulative effects from additional activities.

#### *TES Plant species*

Under Alternative 1, no activities would occur. Both known sites and possible undetected occurrences of threatened, endangered or sensitive plants would not be impacted by project activities. Sensitive species growing in partial shade in forest could lose habitat. Meadows and grasslands would be at risk for increased ingrowth of conifers and shrubs.

#### **Aquatic habitat**

Fine sediment levels are generally above the 20% threshold in the analysis area.

Under alternative 1, current management activities in the analysis area that are likely to be contributing to elevated fine sediment levels are livestock grazing and roads. Past wildfire has likely contributed to an elevated level of fine sediment in some streams in the project area.

The majority of the forested stands in the project area would be represented by a fuel model that is likely to exhibit moderate fire severities in the case of a wildfire. The likelihood of a fire start in the project area is high. Wildfires typically result in increases in fine sediment for three to five years, depending on the wildfire severity (Neary et al. 2005). Adverse impacts to aquatic habitat would likely occur where fine sediment levels exceed the 20% threshold. These levels would likely decrease spawning success for Snake River steelhead and redband trout, and a decrease survival of juvenile salmonids may occur.

Under alternative 1, the majority of the timbered stands would be represented by fuel loading that is likely to exhibit moderate to high fire intensities and severities. These conditions increase the likelihood of a large-scale wildfire in the project area. A wildfire in the area could elevate water temperatures for up to 10 years, depending on the wildfire severity (Dunham et al. 2007). If water temperatures exceeded 64°F for an extended period of time as a result of wildfire, survival of salmonids would likely be reduced.

#### *Federally-listed species – fish*

Alternative 1 of the LJCRP would not affect Snake River steelhead or its designated critical habitat (no effect).

#### *Management indicator species – fish*

Alternative 1 of the LJCRP may impact individual redband trout and their habitat, but will not likely contribute toward federal listing or loss of viability to the population or species (MIIH).

Alternative 1 of the LJCRP may impact individual Snake River steelhead and their habitat, but will not likely contribute toward loss of viability to the population or species (MIIH).

Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years. Current levels of fine sediment in the majority of streams in the analysis area are above the 20% threshold used to indicate adverse impacts to salmonids.

*Regional Forester aquatic sensitive species*

Alternative 1 of the LJCRP will have no impact on Individual western ridge mussels and their Habitat (NI). Watershed and aquatic habitat conditions would likely remain in their current condition for the next 5 years. Current aquatic habitat conditions in the analysis area are not likely limiting for western ridge mussels.

Western ridge mussels would be vulnerable to impacts from large-scale wildfires that result in large increases in fine sediment and changes in peak flows. Western ridge mussels are adapted to habitats with fine sediment; however, large influxes of fine sediment could result in the burying of mussel beds and the death of individuals. Western ridge mussels require stable streambeds for mussel beds to develop. Increases in peak flows that scour streambed substrates destroy existing mussel beds.

*Wildlife**Primary cavity excavators*

Because no harvesting or prescribed fire will occur in Alternative 1, snag habitat will not be altered. Snags would not be reduced for operational reasons or consumed during prescribed burning as in either Alternative 2 or 3. Stress in overstocked stands may lead to increased snag abundance but may also increase fuel loadings, increasing the likelihood of uncharacteristic stand replacement fires. Stand replacing fires would reduce snag habitat for those PCE's associated with live closed canopied forests (e.g. pileated woodpecker), while increasing habitat for those PCE's associated with post-fire conditions (e.g. Lewis's woodpecker). Currently the abundance of post-fire habitat is below the HRV within the project area.

*Pileated woodpecker and northern goshawk*

Quantity of source habitat will not change. Source habitat abundance will remain within the HRV. No harvesting occurs within source habitat leaving habitat quality unchanged. Ongoing tree growth will continue to increase canopy closure and density of large trees and snags, thus increasing source habitat for pileated woodpeckers and goshawks. The abundance of open roads across the planning area will not change in Alternative 1, human disturbance will remain unchanged. Removal of snags for fire-wood and safety will continue at current levels across the planning area. Risk to large scale fire would continue to increase, large-scale stand replacing fires would not provide source habitat for pileated woodpecker or goshawks.

Tables 65 and 66 compare conditions of pileated woodpecker and northern goshawk source habitat by alternative, respectively. Alternative 1 would maintain source habitat within HRV, but would have higher habitat quality in the short-term compared to the action alternatives, where restoration treatments reduce canopy cover or large tree structure.

*American marten*

Because management activities would not take place under Alternative 1, there would be no direct effects on marten source habitat in the short term. In the absence of large scale disturbances, the LJCRP area would continue to provide marten habitat in moist large tree - closed canopy forests and with time potential habitat would transition into source habitat, moving these habitats closer to the HRV. Due to the continued alteration of forest structure, composition and fuels, the loss of habitat due to uncharacteristically severe wildfire may occur.

**Table 65. Pileated woodpecker source habitat conditions by alternative**

Pileated Woodpecker	Alternative 1	Alternative 2	Alternative 3	Comment
Source Habitat (acres)	7,330	8,037	6,406	
% HRV	16%	18%	14%	The current condition as well as the outcome of all alternatives, maintain source habitat within the HRV. The HRV for this species is about 1-39%.
Acres source habitat with harvest	0	3,717	1,444	Acres of pileated woodpecker habitat that has been harvested are likely lower quality.
% source habitat with harvest	0	46%	23%	Acres of pileated woodpecker habitat that has been harvested are likely lower quality. It is expected that within 10-30 years the habitats that were harvested and are of lesser quality will transition to higher quality source habitat
Acres of source habitat not commercially treated	7,330	4,320	4,962	Pileated woodpecker habitat that is not harvested, are likely higher quality habitat.
% HRV of source habitat not treated	16%	10%	11%	Untreated pileated woodpecker habitat is within the HRV (1-39%). It is expected that within 10-30 years the habitats that were harvested and are of lesser quality will transition to higher quality source habitat.
Acres of large ( $\geq 21''$ trees) potentially harvested	0	1,214	0	Loss of large trees will negatively affect the quantity and quality of current and future habitat for pileated woodpeckers.
Miles of road closed and/or decommissioned		23	3	The greater the reduction in open roads, the greater the benefit to pileated woodpeckers. Removal of snags an important habitat feature is greater along open roads.

**Table 66. Northern goshawk source habitat conditions by alternative**

Northern Goshawk	Alternative 1 (and current)	Alternative 2	Alternative 3	Comment
Source Habitat (acres)	19,362	19,106	16,517	
% HRV	55%	55%	47%	The current condition as well as the outcome of all alternatives, maintain source habitat within the HRV (1-46%)

<b>Northern Goshawk</b>	<b>Alternative 1 (and current)</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Comment</b>
Acres source habitat with commercial harvest	0	8205	2681	Acres of Northern goshawk habitat that has been commercially harvested are likely lower quality.
% source habitat with commercial treatment	0	43%	16%	Northern goshawk habitat that has been commercially harvested, are likely lower quality.
Acres of source habitat without commercial treatment	19,362	10,901	13,836	Northern goshawk habitat that has not been commercially harvested, are likely higher quality habitat.
% HRV of source habitat not treated	56%	31%	40%	Northern goshawk habitat that has not been commercially treated is within the HRV. It is expected that within 10-30 years the habitats that were treated and are of lesser quality will transition (through growth) to higher quality source habitat.
Acres of source habitat with potential for trees $\geq 21''$ dbh removed	0	3,984	0	Large trees provide an important habitat component for goshawks.

### *Rocky Mountain elk*

Without management activities, elk cover and forage habitat would not be altered and short-term disturbances (associated with treatment activities) to elk habitat would not occur. The overall area providing cover remains higher than either of the two action alternatives. Under alternative 1, road densities would remain high and in Upper Cottonwood, Broady, Cougar, Davis, Lower Swamp, Peavine, and Rush and Sumac Creeks, and densities in MA 1 and the HCNRA would remain above the Forest Plan Standards (Table 46).

### **Old growth management areas, late-old forest habitat, and connectivity corridors**

No mechanical vegetation treatments would occur under alternative 1, and fires would be suppressed.

There will be no direct impacts to MA15, LOS habitat, or connectivity corridors under Alternatives 1. Indirectly, this alternative will forgo the opportunity to reduce the likelihood of a high intensity and/or stand-replacing fire through treatments. The current level of connectedness would persist, and would improve in quality in the absence of large scale disturbances. In the

absence of silvicultural treatments that reduce tree stocking, the connective corridors will continue to increase in canopy closure and structural complexity. This condition in the moist upland forests would enhance connectivity for species associated with closed canopied forests. Although connectivity would be enhanced over time, susceptibility to insects, diseases, and wildfire would increase.

Conversely, dry upland forests are inherently less structurally complex than cold and moist upland forests. In the absence of silvicultural treatments to reduce tree stocking, these stands would continue to allow the establishment of shade tolerant grand fir, increased canopy closure, and increased stress to competition for resources. In both the short and long-term (30+ years) these drier stands would be subjected to continued increased risks from wildfire, insects and diseases that would kill trees in numbers and distribution that could negatively affect connectivity between patches of dry LOS habitat. These negative effects could render the LOS and connective corridors unsuitable for some of the wildlife species that depend on them as habitat.

#### *Landbird and migratory bird habitat*

In the absence of large scale disturbances, alternative 1 would provide long-term habitat for migratory birds at the same level that exists today (Table 67). Forest fuels would continue to accumulate as fuel reduction treatments are deferred. Alternative 1 would perpetuate and contribute further to increased fuel accumulations, increasing the risks to overstory trees when wildfires occur. Depending on the species and the scale and intensity of wildfires, some species habitats may be improved (e.g. white-headed woodpecker), while other species habitats may be reduced (e.g. Williamson's sapsucker).

**Table 67. Relative effects of the alternatives on landbird and migratory bird habitat.**

Common Name	Habitat Group	Alternative 1	Alternatives 2 and 3
Brown creeper	Cool/Moist Forest; Medium/Large Trees	These habitats are currently at the low end of the RV. Habitat would be provided at the same level that currently exists. At the landscape scale, the risk to uncharacteristic fire which would remove habitat for this species would continue to increase.	Prescribed harvest prescriptions are to maintain habitat abundance though the quality of the habitat in the short-term may be reduced due to loss of canopy cover. Alternative 2 proposes to harvest more habitat for species in this group than Alternative 3. Not harvesting within the RHCA's in Alternative 3 will benefit this species habitats. At the landscape scale, the risk to uncharacteristic fire which would remove habitat for this species would be reduced.
Cassin's Finch	All Forest Communities; Medium/Large Trees	Medium/large tree habitat (>15" dbh) is overall within the RV. In relation to the RV, moist forests are low in closed canopied conditions, while dry forests are low in open canopied conditions. Alternative 1 would provide	Prescribed harvest prescriptions would reduce the canopy closure, the density of medium size trees, and the density of snags. Alt. 2 will reduce the density of large trees. Habitats or species associated with open canopies and/or shrubby understories especially in the dry forests will increase and will move
Williamson's Sapsucker			
Mountain chickadee			

Common Name	Habitat Group	Alternative 1	Alternatives 2 and 3
Ruffed Grouse		habitat at existing conditions. Snag habitat would remain unchanged. Shrubby understory habitats would likely remain suppressed particularly in the dry forests. At the landscape scale, the risk to uncharacteristic fire for this species would continue to increase ; these species would likely respond negatively to wildfire depending on the intensity.	closer to the RV. For species associated with closed canopies, habitat will be reduced. Alt. 2 will reduce the canopy closure, and snags on more acres than alternative 2. At the landscape scale, the risk to uncharacteristic fire would be reduced. A large scale and high intensity disturbance, would likely remove habitat for these species.
White-headed Woodpecker	Dry Forest; Medium/ Large Trees	Habitats for these species are below the RV. Snag habitat would not be reduced. Alt. 1 would provide habitat at the same minimal level as current. At the landscape scale, the risk to uncharacteristic fire would continue to increase. A lower intensity or mixed severity fire may create source habitat for white-headed woodpeckers.	Prescribed harvest prescriptions would reduce canopy closure, the density of medium size trees, and the density of snags. Alt. 2 would reduce the density of large trees on 7163 acres in dry forests. The reduction of canopy will benefit these species. The loss of snags will decrease the quality of the habitat. Alt. 2 will increase the potential habitat for these species on more acres than Alt. 3. Large trees and snags will be reduced on more acres in Alt. 2 than Alt 3. At the landscape scale, the risk to uncharacteristic fire would be reduced. Depending the scale and intensity of a disturbance, habitat may be created or reduced. Post-fire habitat can provide habitat for white-headed woodpeckers.
Flammulated Owl			
Calliope hummingbird	All Forest Communities; Open Forest	In relation to the RV, moist forests with medium and large trees and forests of early structure (<10") is low in the abundance of open canopied forests. Open-canopied habitats in dry forests are all below the RV. Alt. 1 would not change the current amount of habitat that overall is likely reduced. At the landscape scale the risk to uncharacteristic wildfire or disturbance would remain high. Lower intensity disturbance, may provide habitat for some of these species, especially the Townsend's solitaire.	Prescribed harvest will reduce canopy and likely increase habitat for these species. Likely shrub habitat will increase benefitting the Calliope hummingbird. Alt. 2 will reduce canopy on more acres than Alt. 3, likely improving habitat for these species more. At the landscape scale, the risk to uncharacteristic fire would be reduced. Depending on the scale and intensity of a disturbance, habitat may be created or reduced. Post-fire habitat can provide habitat for Townsend's solitaire.
Townsend's solitaire			
Dark-eyed junco			

Common Name	Habitat Group	Alternative 1	Alternatives 2 and 3
American kestrel	Post-Fire Habitat; Open Forest	Post-fire habitat is currently below the RV. Under Alt. 1 source habitat abundance would not be changed. At the landscape scale the risk to uncharacteristic wildfire or disturbance would remain high. High and moderate intensity/scale wildfire would likely increase habitat for these species.	In both Alt. 2 and 3, approximately 615 and 107 acres respectively of forests that were within the Cache creek fire perimeter (2012-currently provide some post-fire habitat ) would be commercially harvested, large trees may be removed in alternative 2 and snags would be reduced likely reducing the quality of habitat for these species. At the landscape scale, the risk to uncharacteristic fire would be reduced. These species are associated with post-fire conditions at a variety of scales and intensities.
Olive-sided flycatcher			
Lewis's Woodpecker			
Peregrine Falcon	Habitat Generalist	No activities are planned that will likely effect this species.	No activities are planned that will likely effect this species.
Ferruginous Hawk	Woodland/Grass/Shrub	Prescribed fire is the only proposed activity planned in these habitats, in Alt. 1, no prescribed fire would occur. At the landscape scale the risk to uncharacteristic wildfire would continue to increase. Depending on the scale and intensity of such a disturbance, the quality of these habitats could be improved or reduced.	Prescribed fire may occur on these habitats in Alt. 2 and 3. Timing and the sizing and spacing of prescribed fire will effect species differently. Prescribed fire conducted prior to the nesting season in the early spring, may reduce nesting habitat for ground- and shrub-nesting species. In the longer term, these habitats may flourish following burning.
Mourning dove			
Black-billed magpie			
Swainson's Hawk			
Killdeer			
Black Swift	Riparian	Habitats for these species would remain at the same level. Particularly in dry forests, canopy closure is above the RV and may be suppressing shrub development in some riparian areas. At the landscape scale the risk to uncharacteristic fire would continue to increase. Likely, in the short-term following a wildfire, habitat for these species would be reduced. In the longer-term wildfire may increase shrubs and habitats for some of these species.	In Alt. 2 proposed activities in these habitats include harvest in XXXX acres of category 4 RHCA's. Additionally in Alt. 2 there are XX acres of harvest prescribed has meadow restoration in Category 1 RHCA in Swamp Ck. Harvest and prescribed fire in RHCA's may increase or decrease habitat for these species depending the species. In the immediate short-term, important shrubby understories may be reduced (if present) but in the longer term these understories may flourish more than if not treated.
Bald Eagle			
Willow Flycatcher			
Red-eyed vireo			
Yellow warbler			
Barn swallow			
Common snipe			

#### *Federally-listed and USFS R6 Sensitive species*

Alternative 1 would have No Effect (NE) to the Canada lynx because it is not considered present on the Forest (Wallowa-Whitman National Forest Lynx Strategy Letter April 19, 2007).

Alternative 1 would also have No Impact on the tailed frog, spotted frog, bald eagle, peregrine falcon, grey wolf, fringed myotis, Townsend's big-eared bat, or spotted bat.

### **White-headed woodpecker and Lewis' woodpecker**

Under this alternative, the risk of uncharacteristic wildfire or disease/insect outbreaks would continue to increase naturally over time because there would be no changes to stand stocking levels or fuel loads from active management. This resulting post wildfire habitat may provide suitable habitat for these species. Wildfire would likely produce snags, and white-headed woodpeckers and Lewis' woodpeckers are known to occur in recent post-fire habitat that has large pine snags (Wightman et al. 2010). The impact to habitat would depend on the size and severity of the disturbance. For these reason, there is No Impact (NI) to the white-headed woodpecker or the Lewis' woodpecker or their habitat under Alternative 1.

## **The social environment**

### **Socioeconomics**

#### *Financial Efficiency and Economic Impacts*

No direct effects on the local economy would occur under alternative 1 (No Action). Within the analysis area, economic conditions and trends (employment, labor income, unemployment, etc.) would not change relative to the LJCRP since no action would be taken. In addition, any potential revenue from the sale of timber would not be realized under alternative 1. Indirect effects on local economic conditions could occur as a result of alternative 1, however, estimates of these changes are not available. The lack of measurable direct and indirect effects translates to a lack of measurable cumulative effects to economic conditions under alternative 1.

As discussed above, greater non-prescribed wildland fire related costs could result if fuels are left untreated under alternative 1. Potential threats and costs to human life, property and fire-fighter safety under alternative 1 would be greater than alternative 2 and 3. Fire suppression costs and risk to life and property should be less when wildland fires occur where hazardous fuels have been treated compared to areas where fuels have not been treated. This is commonly accepted since fires in non-treated areas generally burn hotter, flame length is higher, and fires in tree canopies are more likely. However, it is not possible to predict the level and costs of non-prescribed wildland fire under alternative 1.

#### *Social Impacts*

Under the No Action alternative, social impacts to livelihood, cultural values, and biological values would not change from the present. However, with a greater risk of wildland fire and unchanged conditions for forest health under alternative 1, the possibility of long-term effects to recreation may be greater under this alternative.

#### *Timber Market and Forest Products*

Alternative 1 would not provide new timber for harvest and therefore is not anticipated to affect the timber market relative to the current condition. However, if the incidence of wildfire increases as a result of not completing restoration treatments, large fires could damage existing forest stocks and increase the amount of salvaged wood on the market, leading to decreases in delivered log prices.

### *Non-Market Values*

Under alternative 1, the impacts to ecosystem services may be more severe. For example, water quality enhancement in the long term may be minimal compared to the other alternatives. Without restoration treatments, the forest health could continue to decline along with the ecosystem services it provides (such as air quality, water quality, and biodiversity). Although these services are difficult to quantify, they should be considered.

### *Environmental Justice*

As indicated in the Affected Environment section above, minority and low-income populations exist in the analysis area. While alternative 1 is not expected to have a disproportionately high and adverse human health or environmental effects on these communities, increased susceptibility to wildfire could result. Consequently, additional unmeasurable indirect economic effects associated with increases in wildland fire-related costs are possible, which could result in impacts to local communities. However, there is no reason to suspect that any impacts will disproportionately affect minority and low income populations.

### *Heritage*

No treatment activities would occur, and the current biological and physical processes would be allowed to continue along their present paths with associated risks and benefits. For heritage resources, this means that all 46 eligible or unevaluated sites would not be threatened by inadvertent mechanical operations.

Existing fuels in and around archaeological sites would continue to increase. This may result in more frequent or intense wildfires which could result in site and artifact damage such as spalling of rock features and cracking of artifacts as well as post-fire erosion. Fire suppression actions, especially bulldozer operations, may also damage or destroy surface and subsurface archaeological sites resulting in the loss of those resources and their research potential. Additionally, sites become more visible after wildland fire, especially high-intensity fires, and are much more vulnerable to vandalism.

### *Tribal*

#### *Impacts on hunting, fishing and gathering*

Alternative 1 (No Action) presents the highest risk to the access and availability of hunting, fishing and gathering resources. There would likely be detrimental effects to what remains of the historically open fire dependent ecosystem needed to support healthy, and accessible, treaty resources and their habitats. Loss of fire dependent ecosystems now means stands are less resilient to disturbance, insects, and disease. Many traditional food plants, that also provide browse and forage for wildlife, are reliant on low intensity fire regimes for healthy reproduction (see table 48).

Tribal input suggests that the No Action alternative may best address tribal uncertainty about scope, scale and pace of LJCRP restoration. Some tribal members may prefer to trust in “Mother Nature” (NPTEC, July 8, 2014) to do the restoration work in lieu of taking a risk on accelerated, broad scale treatments and timelines.

#### *Need to address the true value of the landscape over economics*

The LJCRP purpose and need considers both natural resource values and the contribution of the LJCRP to social and economic values. In the action alternatives, timber harvest would primarily

be used as a tool to treat unhealthy stands to move landscapes toward desired, resilient conditions over time, while resulting merchantable timber may be sold through timber sales. No Action would mean that the opportunity to restore and enhance LJCRP landscape conditions would be lost or put on hold.

Tribal comments state that conservation of forest landscapes should be valued over economic benefits. The belief is that past National Forest management created the current unhealthy landscape conditions through uneven age management practices (i.e. “clear cutting”) designed to maximize timber volume (NPTEC July 8, 2014). Therefore, for some tribal members who equate forest management with economic motivations, the effects of No Action would be preferred.

#### *Maintain old growth legacy trees and conserve inventoried roadless areas*

Old growth stands and roadless areas are valued by the Tribe for their natural, ancient settings that provide sanctuary for people and wildlife. In the short term the effects of No Action on old growth and inventoried roadless areas (IRA), barring high intensity fires or other major disturbance, would be little change to their abundance or character. However, over the long term, old growth stands would continue to be encroached by smaller diameter trees (particularly in dry forest) that would out-compete the big trees resulting in diminished biological and structural diversity. Fuel loads would build, and create high risk of disease and stand replacement fire. Landscape conditions and settings associated with traditional uses, treaty resource habitat, and other values associated with old growth stands and IRAs would decline over the long-term.

No Action negatively affects opportunities for proposed maintenance of legacy trees and establishment of new roadless areas compared to alternatives 2 and 3. Without active management, maintenance of old growth stands and conservation of IRA’s values may be lost.

#### *Resource risks of accelerated planning and restoration*

Conflicts exist between the risks of conventional forest management timelines verses the risks of “doing things differently” by increasing the pace and scale of treatments (i.e., acceleration restoration). Tribal members support “trying things differently as long as you don’t throw out the tried and true” management options (NPTEC July 8, 2014), but are skeptical about accelerated restoration.

Alternative 1 would not risk any unintended adverse effects of “doing things differently”, but would also not move the landscape toward shared desired conditions (i.e., a trend toward a more natural range of variation), or take advantage of the opportunity to learn the lessons of accelerated restoration. Learning through monitoring, and using adaptive management strategies, could involve the tribe in a joint effort to increase understanding of the conflicts, risks and benefits to the traditional economy conservation outlined in the action alternatives.

#### *Impacts to traditional plant resources*

In the LJCRP traditional plant habitats (including scab lands, savanna, meadows, riparian areas, seeps, dry and moist forests) are being encroached by particularly shade-tolerant conifers, primarily as a result of fire exclusion (refer to table 48 for plant species, habitat, response to soil/ground disturbance and fire response). No Action poses high risk to traditional plant species and habitats; especially those that are shade intolerant or that respond well to low intensity fire. The majority of the plants listed in table 48 need forest openings and sun to thrive. Historically the Nez Perce tribe used fire to maintain camas, “cous” and huckleberry habitats (Marshall, 1999).

Continued increased canopy cover and litter accumulation would further reduce habitat suitability for many of the species listed in table 48. Potential soil damage from a severe wildfire could reduce potential suitable habitat and, in the case of high intensity fire, kill plants outright.

No Action means that the opportunity to benefit LJCRP traditional plants through landscape level low intensity prescribed fire treatments, thinning of meadow and riparian encroachment, natural fire use, and creation of individual clumps and openings (Franklin et al, 2013) would be lost or delayed, compared to alternatives 2 and 3.

#### *Traditional cultural properties, sacred sites, and other traditional use areas*

Locations and specific information and concerns associated with traditional cultural properties, sacred sites and other traditional use areas, have not been shared by the Nez Perce Tribe. No Action poses unknown effects to these currently unidentified resources. However, it is assumed that the values associated with these types of cultural places, such as private settings, traditional use resources, or spiritual practices, would be at risk to high intensity wildfire and other unplanned disturbance.

#### **Recreation**

There would be no direct or indirect effects under alternative 1 (No Action). Vegetation densities or characteristics would not be modified and the forest would continue to be influenced by natural processes and limited management actions, such as fire suppression. Under alternative 1, no change is anticipated in the number of visitors, frequency or season use in dispersed recreation activities, developed recreation sites, trails, or permitted uses. Recreational visits within the project area would remain near the same levels as previous years and traditional use patterns and recreational opportunities would not be affected. Hunting, hiking and other dispersed recreation and permitted uses access and opportunities are expected to remain unchanged.

In the long term, there would be increasing risk to forested areas by insect and disease epidemics and greater fuel loads, increasing the risk of large stand replacement fires. Long-term sustainability of some of the natural resource values that drive recreation use (e.g., see scenery section, below) would continue to diminish over time.

#### *Scenery*

The no action alternative (alternative 1) would not address the vegetation conditions that are outside the historic range of variability. Alternative 1 would not reduce the risk of uncharacteristic wildfire, which could cause undue effects to scenery, nor will it move the landscape toward the desired condition.

The no action alternative (alternative 1) would have no short term effects to scenic integrity, or scenic stability. Existing scenery integrity and scenic stability would remain the same. The indirect long term effects related to the existing conditions and trends could be substantial. The overstocked stands are under greater and greater stress which is likely to lead to insect and disease epidemics. Fuel loads within the stands increase the hazards of stand replacement fire. All of these conditions will continue to degrade the scenic stability. In the event of a stand replacement fire the scenic integrity would likely be greatly reduced by uncharacteristic fire.

The no action alternative (alternative 1) would maintain the existing Landscape Character, and range of Low to Very High Scenic Integrity (condition). In the short term, the landscape would remain as a mosaic pattern of natural appearing to slightly altered and altered landscape

character and scenic condition as it currently exists. Vegetation would continue to grow through the pattern of natural succession with a high risk of future disturbance, primarily wildfire.

Resiliency to fire, insects, and pathogens would continue to decline. The high fuel loadings have the potential to result in a sudden change to the landscape character that could result from a wildfire that would be seen as a burned off area or the landscape would continue to be affected by diseased tree and associated tree mortality. The current insect and disease infestations would continue to affect the landscape character visually and could result in changes from healthy green canopies to patches that are predominately brown. In the case of wildfire, the landscape character could dramatically change from a forested green setting to an area dominated by the visual evidence of wildfire. Fire intensity patterns would probably range from low to moderate to high viewed in the foreground and middleground from the travel routes, particularly in the IRAs, where mechanical treatment is limited to existing roads. Wildfire visual characteristics would be dominant and evident for 5 to 10 years or more; snags would be created as a result of wildfire. The snags would be dominant for at least 5 years, and then begin to fall and create a jackstraw effect viewed along the travel corridors and would appear visually out of character for a natural appearing landscape. In general, natural forest disturbances that result in extensive areas of dead or dying trees are perceived negatively. There would be some risk to losing the highly valued larger ponderosa pine and Douglas-fir if a wildfire were to occur. A sustainable green scenic forest may not be maintained over time because of this high disturbance risk related to high fuel loadings and potential for catastrophic wildfire.

Alternative 1 would be compliant with the Visual Quality Objectives of the Forest Plan, HCNRA CMP and Joseph Creek Wild and Scenic River Management Plan.

#### *Research Natural Areas*

Under alternative 1, the Horse Pasture Ridge and Haystack Rock areas would remain as a proposed RNAs and continue to be protected from uses which would reduce suitability for RNA designation. This management direction is listed in the forest plan, Pages 4-84 and 4-85, and will remain in effect until there is a revised forest plan or there is an amendment to this portion of the forest plan.

#### *Inventoried Roadless Areas*

There would be no decision to implement actions within Potential Wilderness Area, Inventoried Roadless Areas, other undeveloped lands, or environmental organizations unroaded areas under Alternative 1. These areas would continue to depart from reference conditions in forest structure, composition, density and pattern due to current fire suppression and grazing policies. Potential Wilderness Areas identified during Forest Plan Revision will still meet the criteria identified in FSH 1909.12 Ch. 71 as no evidence of past harvest or roads would be created through selection of the no action alternative.

The forested landscape in these areas would continue to support increased density of fire intolerant species that create the potential for uncharacteristic fire severity and effects. Fire hazard would continue to increase with an associated increase of more intense fire occurring at severities and a scale than what would have occurred under reference conditions. This type of fire could cause a loss of important ecosystem components (such as large trees of seral species) and loss of a natural appearing landscape with high scenic quality. Alternative 1 would increase the risk to these characteristics.

### *Potential Wilderness Areas*

Alternative 1 would not affect any PWAs. All current opportunities for solitude would remain, all inherent characteristics of the area would be retained, and no impacts from temporary roads would occur. Indirectly, if a fire were to burn through the area, sight distance would increase and the visitor's ability to experience solitude would decrease. Other characteristics important to these areas may be negatively affected by uncharacteristic fire.

## **Cumulative Effects**

### **Vegetation**

Alternative 1 would not contribute to moving forest composition, structure, density toward desired conditions or enhancing forest pattern or size class distribution or improving trends in insect and disease susceptibility.

### **Air Quality**

There are no cumulative effects to air quality if Alternative 1 is selected as there are no direct effects.

### **Disturbance and Fire Severity**

Past harvest, fuel treatment, fire suppression, and livestock grazing have shaped the current stand conditions and altered disturbance processes across the LJCRP area. Fire suppression and livestock grazing would continue to alter the disturbance processes and in general would increase the severity of those disturbances. The landscape would potentially lose the large, early seral, old trees on the landscape to fire or insect mortality as the forested stands would continue to increase density and favor late-seral species at the expense of early seral (ponderosa pine and larch) tree species regeneration. There is the potential to alter seed source availability and seed bed viability under this Alternative.

With the exception of the effects of fire suppression on increased forest and shrub densities, the no action alternative would not contribute to the cumulative effects of past and present activities. Past timber management activities including regeneration harvest, commercial thinning, precommercial thinning and salvage have resulted in fewer mature and old growth stands, with fewer large trees and large snags. These activities have favored wildlife and plant species (e.g., some Neotropical migratory bird species) that prefer early-seral stand conditions. Recreation, wood cutting, and roads would continue to lead to a reduction in snag habitat for species dependent on these habitat components in some areas.

### **Tribal**

Past, present, and reasonably foreseeable activities primarily include administration of range allotments, timber harvest, vegetation management, motorized recreation, firewood cutting and dispersed recreation. Under alternative 1, including current tribal, social, cultural, biological and traditional practices would continue but these activities would likely be disrupted. Over time cumulative effects of No Action to the LJCRP would accrue; likely contributing to a higher risk of catastrophic disturbance and degraded ecological conditions.

## Recreation

Past projects and actions which have affected recreation uses include timber harvest, and road construction. Residual effects of past timber harvest influences dispersed recreation activities by displacing some uses (i.e. big game hunters may go to areas with more denser canopy covering, berry pickers may go to areas where plants are more abundant), whereas it may have encouraged other uses (i.e. open areas allow better viewing background scenery). Road construction has had both a positive and negative effect and has been viewed by some users as increasing access to areas, yet has had a negative affect for non-motorized users who may have previously used an unroaded area. The allowance of cross country travel has affected some non-motorized recreation activities due to sight, sound and emissions of vehicles. The establishment of dispersed camps has provided traditional camp sites by making user created routes to the sites and expanding areas for camping. These things would continue under the no action alternative; therefore there are no cumulative effects associated with the no action alternative.

## Alternative 2: Direct and Indirect Effects

### The physical environment

#### Climate

Relative comparisons of the degree of climate change adaptation between alternatives are based on evaluation of one or more of the following indicators:

- Acres available for planting (even-aged harvest) and providing opportunities to adapt tree species composition to changing climates
- Acres of designated wildlife corridors, which can reduce barriers to movement
- Acres of thinning to restore disturbance regimes and/or reduce uncharacteristically severe wildland fires
- Miles of roads with improved drainage and reduced sediment delivery, thus reducing hydrologic connectivity of the road system
- Miles of riparian restoration, which restores floodplain connectivity, flow regimes, and/or increases effective stream shade
- Acres of invasive plants treated

Alternative 2 would bring the LJCRP area closer to reference conditions in vegetation and disturbance regime in comparison to the No Action and Alternative 3, creating a more resilient and sustainable condition in the face of climate change.

#### Soils

##### *Surface Erosion*

Surface erosion will increase under alternative 2, due to the following activities: temporary road construction, temporary increase in road traffic, road maintenance, road reconstruction, wildland fire and equipment operation. Surface erosion may affect site productivity and water quality.

Approximately 12.6 miles of temporary roads are proposed in alternative 2 (Map 9). Effective ground cover is often lost during the construction and use of temporary roads which destabilizes the surface and soil structure. In some instances, entire soil horizons may be mechanically displaced during temporary road construction. Mitigation Measures and Best Management Practices (Appendix J) are designed to minimize these effects. Approximately 20 acres of the 178,000 acre analysis area on Forest Service lands will be directly affected by the construction and use of temporary roads in alternative 2.

Road traffic will likely increase under alternative 2, due to the proposed management activities. Vehicular traffic destabilizes material in unpaved travelways, cut slopes and fill slopes. Travelways are heavily compacted, and have low rates of infiltration which increases surface runoff. Increases in road use can increase sediment production rates by many orders of magnitude. (Reid and Dunne 1984, Ramos-Scharrón 2007). We used the Watershed Erosion Prediction Project (WEPP) model to characterize the potential increase in sediment yields, as a result of increasing road traffic across the entire haul system for the Joseph Canyon Restoration Project. Sediment yields due to increased traffic were static except for a moderate increase along the 4655 road in the northeast portion of the project area and along the 150 spur of the 4650 road. These roads will be prioritized for erosion mitigation measures and evaluated for road improvements prior to haul. Any increases in sediment yield would persist at higher rates over the duration of project implementation but all increases in traffic are unlikely to be uniform over space and time and will depend largely on how implementation is phased for each portion of the analysis area. Improving the structure, stability and drainage of the haul road system will mitigate most of the erosion potential.

Road maintenance and road reconstruction will likely cause short-term increases in surface erosion by destabilizing compacted soil and sediment aggregates. By design, road maintenance and road reconstruction are intended to minimize road-related erosion and erosive potential throughout periods of increased road use. Improvements, such as culvert replacements, ditch cleaning outs, surface recontouring, roadside revegetation and reinforcing road foundations are likely to have positive effects by minimizing surface sediment yield, reducing the probability of road failure and improving hydrologic function. An additional 25 miles of roads are proposed for decommissioning in alternative 2. Some road decommissioning will decompact and destabilize the surface, increasing the susceptibility of surface erosion. After effective ground cover is reestablished and site is stable it will be lower threat for surface erosion. The time for a site to stabilize varies but can take anywhere from 3 months to 2 years. In alternative 2, 6 culverts will be upgraded to withstand a 100 year peak flow event, and 86 miles of road will be improved to limit road-related erosion and improve hydrologic function.

Decompacting the road surface during decommissioning or obliteration activities loosens the soil, thus making it more likely to be mobilized during the first significant run-off period unless the road is on relatively flat terrain, not near streams, or sufficient ground cover (mulch, woody debris, etc.) is provided. Since there is culvert removal associated with some of the proposed decommissioning activities there is the potential to deliver sediment into stream channels during project implementation. Active road decommissioning near streams will have short-term, construction-related effects. These projects may cause a short-term degradation of water quality due to sediment input and turbidity. Stream bank condition and habitat substrate may also be adversely affected in the short term. This would be a short-term effect since turbid conditions would dissipate soon after the in-stream work phase was completed, generally in a few hours. However with careful project design and mitigation measures such as erosion control, these

effects are expected to be of a limited extent and duration. In addition to existing decisions in the LJCRP area, 25 miles of roads are proposed for decommissioning in alternative 2.

Project design criteria and associated BMPs for road obliteration and decommissioning would reduce the risk of sediment entering any stream course. The impacts to water quality caused by sedimentation due to temporary road construction, reconstruction, maintenance, or road decommissioning, if any, would be short-term and undetectable at the watershed scale.

At the landscape scale, surface erosion may increase substantially in the event of a large scale disturbance. The treatments proposed in all action alternatives will mitigate some of this risk by restoring stand structures and species compositions (see Fire and Fuels Report). Vegetation management is proposed on 22,119 acres in alternative 2 that may reduce the intensity and scale of future landscape level disturbances that would subsequently increase surface erosion and mass wasting potential.

#### *Sediment from harvest activities*

Thinning, particularly within RHCAs, is a potentially ground disturbing activity that has the potential to cause a temporary reduction in water quality by allowing sediment to enter stream channels from surface erosion or run-off. Tree falling, ground-based yarding methods, and to some extent cable yarding methods (when full suspension isn't achieved) disturb soils that may result in minor erosion or displacement at the site level. Ground-based harvesting equipment and cable yarding does cause some direct soil displacement which would be mitigated through project design criteria. Most of the soil movement/erosion resulting from timber harvesting would travel short distances before being trapped by duff, woody materials, and other obstructions. The probability of overland surface runoff on uncompacted soil surfaces is also low for the soils in the project planning area.

Project design criteria would incorporate PACFISH riparian protection buffers along all intermittent streams in old forest structures. Buffer width design along intermittent streams would take into account the stream influence zone, steepness of slope, size and location of trees, orientation of the site to the sun (aspect), slope stability, and stream bank stability. Riparian protection buffers would include any buffer of hardwood vegetation occurring along the stream bank. To further reduce the risk of surface erosion entering streams as fine sediment, only low impact harvesting equipment such as, mechanical harvesters or skyline systems, which have minimal ground disturbance would be allowed within restricted distances outside of the no harvest buffer consistent as described in the LJCRP Implementation Plan. Mechanical harvesting equipment would be required to operate on slash-covered paths, and travel routes would be limited to one pass over a path whenever possible. Trees in this zone would be directionally felled away from the protection buffers to minimize the disturbance to the forest floor.

These vegetative buffers would act as an effective barrier to any sediment being transported into stream channels by surface erosion or run-off and would minimize the risk of any channel or water quality impacts. The stream protection buffers on either side of the streams would likely retain any displaced and eroded soil before it is transported to the stream channel. These buffer widths would also allow soil infiltration between the unit and any water source. Surface roughness, vegetation, and duff in untreated buffers would filter most sediment coming off surfaces before reaching streams. The use of skyline or helicopter yarding systems on steeper ground within riparian reserves would reduce ground disturbance, thus lowering the probability of soil displacement within the project area. Seasonal restrictions on ground-based harvesting

operations would further reduce the risk of soil disturbance and run-off. Even if some soil movement occurred, the vegetated buffer strips along every perennial or intermittent channel would act as an effective barrier. The probability that measurable amounts of fine sediment would enter any stream within the project area as a direct result of logging activity is low (See WEPP analysis in the Physical Environment supporting documentation).

Yarding will be accomplished utilizing a combination of mechanical harvester, processor, tractor, skyline, and helicopter logging systems. Project design criteria would minimize erosion by using techniques such as seasonal restrictions and stream protection buffers

All ground-based tractor operations will take place on slopes averaging less than 35% and may operate within 75 feet of any channel to avoid the risk of damage to soil and water resources (See LJCRP Implementation Plan) This restriction may be waived if soils are dry or frozen or if operators switch to skyline or other non-ground based systems. District or Forest Soil and Water specialists will be consulted in regard to any waiver pertaining to using ground-base logging systems outside the normal operating season. Mechanical harvesters and forwarders would be required to work on a layer of residual slash placed in the harvester path prior to advancing the equipment.

Outside of the riparian protection buffers, additional restrictions may apply (See LJCRP Implementation Plan). Only low impact, minimal ground disturbing harvesting equipment such as mechanical harvesters or skyline systems (suspension yarding) will be allowed. Trees in this zone would be directionally felled away from the no-harvest buffer to minimize the disturbance to the forest floor.

All skyline yarding will incorporate one end or full suspension if needed, such as when yarding over a stream channel or seep. Trees cut in the units identified for skyline logging would be primarily yarded with the leading edge of the log suspended above the ground and the trailing end dragging along the ground surface.

Some soil disturbance is expected to occur along skyline corridors in these units, making soil available for movement. Erosion control work following yarding activities would reduce the amount of soil that moves off site in the event surface runoff does occur. The fully vegetated riparian protection buffers will intercept most soil movement and greatly reduce the amount of sediment delivery to any stream. Implementation of these best management practices will result in a non-measurable amount of sediment being delivered to streams.

#### *Sediment from log haul*

See “Effects common to all action alternatives”.

#### *Mass Wasting*

Mass wasting is a natural geomorphic process that supplies sediment and debris to streams for the structure and complexity needed for quality aquatic habitat. Human activity can intensify mass wasting to an extent that degrades habitat by destabilizing slopes through vegetation removal, water diversions and road construction.

A review of historic landslide data from the Oregon Department of Geology and Mining Industries (2014) does not indicate occurrences of recent shallow landslides within the Joseph Canyon analysis area. The floods during the winter of the 1996-1997 generated minor debris flows and incised many of the upland channels in the project area. The magnitude and

distribution of the effects associated with the floods of 1996-1997 are characteristic of 50 – 100 year water event (Sondena and Kozusko 2003a, US Geological Survey 2014). For all sediment modeling 30 and 50 year weather streams were used from the Wallowa weather station to statistically capture the 1996-1997 flood events. A Generic Erosion Potential model (Burnett 2007) was used across the landscape which approximates mass wasting potential based on slope and slope convergence. Other site specific variables, such as soils (SSURGO, 2014), vegetative cover, climate and underlying geology were evaluated in the field and from the best available data. Based on this analysis, activities proposed in the action alternatives are unlikely to increase the timing, frequency or intensity of mass wasting events. Most risk is mitigated through the implementation of no-harvest buffers, equipment restrictions on steep or unstable ground and the lack of new permanent features, such as roads, to intercept surface water. In Alternative 2, there are 110 acres of ground based timber harvest proposed in areas of lower relative stability or approximately 1.5 percent of areas proposed for ground based harvest and 12.6 miles of temporary roads.

Project design features, such as no harvest buffers, equipment restrictions on steep or unstable areas and the hydrologic restoration of temporary roads and existing legacy travelways greatly reduces the risk of a mass wasting event being triggered as a result of the proposed management activities.

### *Soil Productivity*

Detrimental Soil Conditions (DSC) directly impact soil productivity by displacement, compaction, loss of organic matter, rutting, erosion and loss of porosity. Land management activities, such as road construction and heavy equipment operation have the greatest potential to create detrimental soil conditions. Land managers can reasonably predict that helicopter and skyline harvest activities will not degrade soil conditions below acceptable tolerances (Reeves et al. 2011). Therefore, temporary roads and ground based harvest activities will be the focus and measure of detrimental soil conditions.

Detailed investigations of similar harvest units in the area indicate pre-treatment DSCs ranging up to 20% with a median distribution of approximately 8%. An evaluation of aerial photography and field conditions for the LJCRP indicate similar conditions. Mitigation Measures are incorporated into project design to manage DSCs within the allowable Wallowa Whitman Forest Plan tolerances of 20%. This may include remediation of DSCs created as a result of proposed activities and remediation of affects from previous management activities, inside and outside planned activity units. Conditions existing outside of planned activity units that should be remediated through subsoiling and revegetation include legacy travel routes, user created routes, legacy skid trails and landing sites. In Alternative 2, ground based harvest and 12.6 miles of temporary road construction may directly contribute to DSCs at the management unit scale as a result of the proposed management activities. Project design criteria will be in place to mitigate much of the potential for DSCs and plan will be in place to remediate high priority areas affected by these activities. (See the LJCRP Implementation Plan and Appendix J, Best Management Practices and Project Design Criteria).

Extensive soil degradation across a landscape may affect long-term productivity growing sites, limiting the potential to express vegetation as it would under unimpeded growing conditions (Grigal, 2000). Limiting site potential may compromise the potential of achieving a vegetative structural and species composition consistent with the historical range of variation, which, in turn, can effect wildlife species, natural resource economics and resilience to disturbances.

However, the scope and extent of the actions proposed in the LJCRP, with or without remediation, are unlikely to have measurable effects on productivity beyond the site scale.

## Air

See “Effects common to all action alternatives”, above.

## The biological environment

### Vegetation and disturbance regimes

Table 68 lists the cutting treatments proposed under alternative 2, approximate acres for each treatment and the percent of the total treatment acres each treatment type represents. The following is a list and description of other treatments that are proposed for alternative 2 and are not listed in the description of treatment type table (above).

- Single Tree Selection in MA15 –similar to other single tree selection treatments with emphasis on old growth characteristics.
- Meadow Restoration – removal of young trees that have encroached onto meadow complex adjacent to Swamp Cr.

A total of 22,119 acres of cutting treatments are proposed. Moderate and high intensity single tree selection treatment types account for almost half of the treatment acres and stand improvement (non-sawlog) treatments add another 25 percent. Under this alternative, approximately 39 percent of the forested acres within the project area would have a cutting treatment.

### *Forest Cover Type*

Cover type percent by potential vegetation group and percent change from existing due to alternative 2 treatments are listed in Table 69. The prevalent effect in terms of movement toward RV would be in the ponderosa pine cover type. There would be a ten percent increase in the dry PVG and another 2 percent increase in the moist PVG. There would also be notable changes to the Douglas-fir cover type with a nine percent reduction in the dry PVG and a 2 percent reduction in the moist PVG. Overall, alternative 2 would move all cover types in both PVGs closer to RV with the exception of lodgepole pine in the moist PVG.

### *Forest Structural Stages*

Table 70 summarizes the forest structural stage percent by potential vegetation group and percent change from existing due to alternative 2 treatments. Highest movement toward RV would be in the OFSS structural stage with a six percent increase in the dry PVG and two percent increase in moist. The SE stage would experience movement away from RV in both PVGs. Overall, alternative 2 would result in movement toward RV in OFSS and SI and movement away from RV in all other stages. This is due to the time lag of development from the UR/YFMS structural stages to the OF structural stages and illustrates the need for continued management as the UR/YFMS stages mature in order to further move the percentage of dry PVG OFSS stage within RV.

**Table 68. Alternative 2 – Acres by cutting treatment type in the Lower Joseph Creek Restoration Project area**

<b>Treatment Type</b>	<b>Approximate Acres</b>	<b>Percent of Treatment Acres (Percent of Forested Acres)</b>
Stand Improvement – Stands Dominated by Seedlings and Saplings	3,562	16%
Stand Improvement – Stands Dominated by Poles	1,891	9%
Single Tree Selection – High Intensity	5,126	23%
Single Tree Selection – Moderate Intensity	5,819	26%
Single Tree Selection – Low Intensity	1,275	6%
Single Tree Selection in MA15 – Moderate Intensity	763	3%
Single Tree Selection in MA15 – Low Intensity	30	<1%
Group Selection – High Intensity	1,942	9%
Group Selection – Moderate Intensity	596	3%
Group Selection – Low Intensity	38	<1%
Intermediate Treatment – High Intensity	124	1%
Intermediate Treatment – Mod Intensity	123	1%
Intermediate Treatment – Low Intensity	89	<1%
Savanna*	558	3%
Meadow Restoration* (Swamp Creek)	58	≤1%
<b>Cutting Treatment Total (Forested Acres)</b>	<b>21,967 (21,378)</b>	<b>100% (39%)</b>
<b>Forested Acres – No Cutting Treatment</b>	<b>33,980</b>	<b>(61%)</b>
<b>Total Forested Acres</b>	<b>55,365</b>	<b>(100%)</b>

\*Savanna and meadow restoration treatments are in areas that do not meet the definition of forested.

### *Tree Density Class*

Table 71 displays the density class percent by potential vegetation group and percent change from existing due to alternative 2 treatments. Overall, alternative 2 would move or maintain all density classes within RV for both PVGs.

### *Pattern*

Alternative 2 would treat 21,378 acres using the Individuals, Clumps and Openings (ICO) approach to restoring forest spatial pattern.

### *Size Class Distribution*

Thinning treatments would result in an immediate increase in average tree diameter by favoring dominant and codominant trees. The treatments would also increase average tree diameter in the short term by reducing intertree competition and improving individual tree growth.

Table 72 displays the estimated post treatment size class distribution and the percent change from the existing distribution. For both the dry and moist PVGs, tree size class would be trending toward larger tree size classes with a nine and seven percent increase respectively in the >20 size class.

**Table 69. Alternative 2 – Post treatment distribution of forest cover types in the LJCRP area**

Potential Vegetation Group	Cover Type	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Dry upland forest (UF)	Ponderosa pine	16,226	38% (+10)	50-80
	Douglas-fir	17,962	42% (-9)	5-20
	Western larch	715	2% (+1)	1-10
	Lodgepole pine	89	<1% (-<1)	0
	Grand fir	6,983	16% (-2)	1-10
	Engelmann spruce	0	0% (0)	0
	Unknown	438	1%	
Dry UF Total		42,407	100%	
Moist upland forest (UF)	Ponderosa pine	1,690	13% (+2)	5-15
	Douglas-fir	5,591	43% (-2)	15-30
	Western larch	763	6% (+2)	10-30
	Lodgepole pine	173	1% (-1)	25-45
	Grand fir	4,603	36% (-<1))	15-30
	Engelmann spruce	65	1% (-<1)	1-10
	Unknown	64	<1%	
Moist UF Total		12,958	100%	
Grand Total		55,365		

**Table 70. Alternative 2 – Post treatment distribution of forest structural stages in the LJCRP area**

Potential Vegetation Group	Structural Stage	Acres		Percentage of Potential Vegetation Group (Percent Change from Existing)		Range of variation (%) (Powell 2010)
Dry UF	OFSS	2,643		6% (+6)		40-60
	OFMS	9,014		21% (+1)		5-15
	YFMS	2,704	19,362	6%	46% (+1)	5-10
	UR	16,658		39%		
	SE	3,712		9% (-9)		10-20
	SI	7,464		18% (+1)		15-25
	Unknown	184		<1%		
Dry UF Total		42,407		100%		
Moist UF	OFSS	215		2% (+2)		10-20
	OFMS	4,261		33% (+3)		15-20
	YFMS	1,811	4695	14%	36% (+<1)	10-20
	UR	2,884		22%		
	SE	1,675		13% (-5)		20-30
	SI	2,080		16% (+<1)		20-30
	Unknown	23		<1%		
Moist UF Total		12,958		100%		
Grand Total		55,365				

**Table 71. Alternative 2 – Post treatment distribution of tree density classes in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Tree Density Class	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Dry UF	Dry High	6,425	15% (-18)	5-15
	Dry Mod	9,457	22% (-10)	15-30
	Dry Low	26,292	62% (+28)	40-85
	Unknown	206	<1%	
Dry UF Total		42,407	100%	
Moist UF	Moist High	3,283	25% (-20)	15-30
	Moist Mod	5,092	39% (+11)	25-60
	Moist Low	4,373	34% (+9)	20-40
	Unknown	201	2%	
Moist UF Total		12,958	100%	
Grand Total		55,365		

**Table 72. Alternative 2 - Tree size class distribution in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Tree Size Class (diameter range in inches)	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)
Dry upland forest (UF)	<5	5,328	13% (-4)
	5-10	2,946	7% (+5)
	10-15	10,684	25% (+13)
	15-20	12,526	30% (+2)
	>20	10,711	25% (+9)
	Unknown	176	<1%
Dry UF Total		42,407	100%
Moist upland forest (UF)	<5	1,438	11% (-5)
	5-10	1,425	11% (+5)
	10-15	2,708	21% (-6)
	15-20	3,394	26% (-2)
	>20	3,920	30% (+7)
	Unknown	64	<1%
Moist UF Total		12,958	100%
Grand Total		55,365	

### ***Disturbance and Fire Regime***

See “Effects common to all action alternatives”, above. The action alternatives vary in effect based solely on intensity of treatment represented by the number of acres. Alternative 2 includes more acres of harvest and SI, thereby directly improving forest structure, density, and composition and associated fire regime characteristics.

### **Prescribed fire (planned and unplanned)**

Alternative 2 has more area identified as a high priority for prescribed fire (48,577 acres) than Alternative 3 (46,480 acres), primarily due to the relatively greater forest area treated mechanically, and thus needing activity fuels treatment. Alternative 2 has the largest beneficial impact on fire regime departure and landscape resiliency by burning approximately 4 to 6 percent of the landscape per year compared to the reference of 6 – 15 percent and in high fire years approximately 5 – 10 percent is predicted to burn. This is within the reference fire regime and expected natural burn pattern insofar as the area adapting to and with fire as a disturbance process.

### **Activity Fuels**

There would be more activity fuels created with the implementation of Alternative 2 as compared to Alternative 3. The treatment of activity fuels in “Effects common to all action alternatives” remains the same. Disposition of activity fuels is a key part in ensuring that fire severity does not increase due to the additional accumulation of fuels as a result of silvicultural activity. There is no increased impact to fire risk under Alternative 2 when compared to Alternative 3.

### **Fire Management Decision Space**

Alternative 2 creates the most decision space of the action alternatives to manage wildland fire (planned and unplanned ignitions). State-and-transition modeling for the LJCRP area (Appendix C) indicates that during a high fire year in the LJCRP area the amount of the landscape that burns is within the expected fire regime extent (6-15%/year). Although there is no difference between expected acres intentionally burned with planned and unplanned ignitions, (4 – 6%) depending on the year, there is a large benefit to managing unplanned ignitions under Alternative 2 due to the active management of IRA, PWA, Designated Old Growth, and RHCAs. This creates an environment with less ecological and social risk of having unwanted fire effects such as uncharacteristically severe fire or fire affecting a large portion of the area (particularly within or adjacent to IRA, PWA, Designated Old Growth, and RHCAs) in one year such as to impact the character of forest succession and fire regime. Alternative 2 positively affects the ability of wildland fire to become a restorative process at an ecologically appropriate scale and severity.

### **Insects and Disease Susceptibility**

Table 73 lists the estimated, alternative 2 post treatment susceptibility ratings for the six insect and disease agents associated with the PVGs and cover types within the LJCRP area. The following is a comparison of expected post treatment ratings to existing ratings, as an indication of stand conditions that are conducive to improved forest health and trending toward the range of variation (RV).

Dry PVG

- Defoliators and Douglas-fir beetle would be outside RV for all ratings, with a higher percentage in the low and moderate ratings and lower percentage in the high rating than existing
- Fir engraver would be the same as existing for all ratings
- Bark beetles in ponderosa pine would continue to be outside RV for all ratings, with the low rating moving closer to RV.
- Douglas fir mistletoe would continue to be below RV for the low rating, above RV for the high ratings and within RV for the moderate rating.
- Root diseases would continue to be within RV for the low and high ratings, the moderate rating would increase outside RV.

#### Moist PVG

- Defoliators would continue to be within RV for all ratings. The low rating is higher, the moderate rating is the same and high rating is lower than existing.
- Douglas-fir beetle would move toward RV for the low and high ratings and continue within RV for the moderate rating.
- Fir engraver would be outside RV for all ratings. The low and high rating would move toward RV..
- Bark beetle in ponderosa pine would move further below RV in the low rating, and above in the moderate rating and remain within RV for the high rating.
- Douglas-fir dwarf mistletoe would be outside RV for the low and high ratings. The low rating would move up toward RV and the high rating would move down toward RV.
- Root diseases would be outside RV for all ratings. The ratings would continue on the current trend of above RV for the low and moderate ratings and below RV for the high rating.

**Table 73. Alternative 2 – Post treatment insect and disease susceptibility in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Agent	Susceptibility Rating - % of Forested Area					
		Low		Moderate		High	
		Post Trt.	RV Range	Post Trt.	RV Range	Post Trt.	RV Range
Dry upland forest (UF)	Defoliators	31%+	40-85%	45%+	15-30%	24%-	5-15%
	Douglas-fir Beetle	17%+	35-75%	53%+	15-30%	29%-	10-25%
	Fir Engraver	41%=	45-90%	45%=	10-25%	14%=	5-10%
	Bark Beetles in P Pine	22%-	5-10%	59%+	15-30%	19%-	40-90%
	Douglas-fir Dwarf Mistletoe	14%=	25-55%	39%=	15-40%	46%=	20-35%
	Root Diseases	34%+	30-60%	52%+	25-50%	14%-	5-25%
Moist upland forest (UF)	Defoliators	10%+	5-10%	29%=	20-30%	61%-	35-90%
	Douglas-fir Beetle	6%+	30-60%	30%+	20-40%	64%-	10-30%

Potential Vegetation Group	Agent	Susceptibility Rating - % of Forested Area					
		Low		Moderate		High	
		Post Trt.	RV Range	Post Trt.	RV Range	Post Trt.	RV Range
	Fir Engraver	20%+	30-70%	37%+	20-35%	43%-	10-20%
	Bark Beetles in P Pine	28%-	40-70%	64%+	15-35%	8%-	5-25%
	Douglas-fir Dwarf Mistletoe	12%+	30-65%	33%=	20-45%	55%-	10-20%
	Root Diseases	22%+	5-15%	56%+	20-50%	22%-	35-75%

+ increase from current; - decrease from current; = same as current.

Dwarf Mistletoe and the Degree of Mistletoe Infestation - Design criteria common to all treatment types include discriminating against mistletoe infected trees, discriminating against host species (Douglas-fir) and creating conditions that minimize potential for spread to uninfected trees. This would result in a reduced mistletoe infection wherever mistletoe infections occur within the 21,378 acres of cutting treatment proposed under alternative 2. This includes 336 acres of cutting treatment in moderate to heavily mistletoe infected stands.

#### *Timber Resource*

There would be approximately 16,000 acres of harvest treatment (acres treated that remove timber volume) and there would be approximately 10,400,000 cubic feet of timber volume removed as a result of restoration treatments. This would be a direct beneficial effect of Alternative 2.

#### *Rangelands and understory vegetation*

See “effects common to all action alternatives” for a general description of effects from LJCRP activities. Under alternative 2, 17,000 acres of dry upland forest are projected to be at or below 40% canopy cover. The amount of forage depends on many factors, such as annual variations in precipitation, heat, soil, competing vegetation. Low to moderate intensity fire may increase fire resilient grass species such as pinegrass. Using a conservative estimate of 10% increase in forage for dry upland forest stands that are taken to low density, about 17% of the treated acres in allotments in alternative 2 (see map 17) would show increased forage production.

#### **Non-native invasive plants**

Alternative 2 is similar to Alternative 3 in treatments, but Alternative 2 would treat areas in designated old growth (MA15) and Inventoried Roadless Areas, resulting in more acres of commercial harvest, and thinning. Table 74 compares the numbers of acres that would be treated under alternative 2 through commercial harvest and thinning that would be in areas with known noxious weeds.

**Table 74. Acres proposed for treatment in Alternative 2 through commercial harvest and thinning that would be in areas with known noxious weeds.**

Species	Commercial Logging		Thinning	
	A2_Treat	A3_Treat	A2_Treat	A3_Treat
<i>Centaurea maculosa</i>	90	79	10	10
<i>Centaurea diffusa</i>	123	102	33	33
<i>Cirsium arvense</i>	38	38	15	13

Species	Commercial Logging		Thinning	
	A2_Treat	A3_Treat	A2_Treat	A3_Treat
Hieracium aurantiacum	0	0	3	3
Hieracium pratense	657	502	411	411
Onopordum acanthium	232	9	0	0
Potentilla recta	2	2	0	0
Senecio jacobaea	10	5	0	0
Total acres	1152	738	473	470

Alternative 2 would implement all previous decisions for road closures made by the WWNF and close some additional road segments. The overall differences by alternatives in miles of weeds along haul routes are displayed in Table 75. Alternative 3 implements the Wallowa County NRAC road plan, where very few road segments will be closed. External haul routes are common to both alternatives.

**Table 75. Miles of weeds along haul routes by alternative**

Scientific Name	External Haul Rts	Alt 2 Haul Rts	Alt 3 Haul Rts	Temporary roads (Alts 2 and 3)
Centaurea diffusa	4	7	8	0.02
Centaurea maculosa	1	5	7	0.02
Cirsium arvense	4	4	4	0
Hieracium pratense	0	8	8	0
Onopordum acanthium	0	1	1	0
Potentilla recta	0	0.3	0.3	0
Senecio jacobaea	0	0.2	0.2	
Total Miles Infested	9	24	28	

Planned temporary roads are common to both alternatives, while mileage appears to be low (12.6 miles), the temporary roads would be constructed through weed populations and the risk of spread is high.

### TES Plant species

Two *Calochortus macrocarpus* v. *maculosus* populations (grassland habitats, see Appendix F) are adjacent to units that will be treated in Alternative 2, but not treated in Alternative 3 (Table 76).

**Table 76. *Calochortus* populations adjacent to Alternative 2 forest thinning units that are not treated in Alternative 3**

FS Site ID	Species	Unit
0616020102	<i>Calochortus macrocarpus</i> v. <i>maculosus</i>	29
0616020106	<i>Calochortus macrocarpus</i> v. <i>maculosus</i>	52A

See section “Effects common to all action alternatives”, above for a description of forest management treatment effects on *Calochortus macrocarpus* v. *maculosus*. Direct and indirect effects to grasslands may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH).

There are no documented species from moist meadows, wet meadows, riparian areas, or springs and seeps. Suitable habitat for mesic TES plant species has limited potential to be directly impacted by the vegetation management activities proposed in alternative 2, because nearly all the riparian areas and other mesic features are protected by INFISH buffers. A very limited amount of timber harvest and log skidding would occur in RHCAs. RHCA harvest would occur only in the outermost portion of RHCAs, not within the riparian zone. Along Category 1 and 2 streams, a minimum 100 foot buffer would be maintained. Category 4 RHCAs will be treated in alternative 2, but seeps and springs will be protected from logging and thinning activities, and there will be a 25 foot variable width no harvest and no equipment buffer established during implementation by a hydrologist or fisheries biologist. Direct and indirect effects are unlikely in these habitats.

Alternative 2 will have the most impact on lithosol habitat due to the greater extent of treatments in this habitat type compared to alternatives 1 and 3. Direct effects include crushing plants with machinery, burying plants during grading, landing construction, damaging plants during felling and yarding, and burying plants under slash piles. Indirect effects are soil compaction and spread of competitive noxious weeds and invasive annual grasses. Known populations will be flagged prior to road grading and other road improvements, and designation of parking areas and landings, with work overseen by a District Botanist. In addition, equipment operators will receive maps with known sites and instructions to avoid flagged areas. With mitigations, alternative 2 may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH) in Lithosols in LJCRP. Table 77 summarizes the locations of lithosols with Wallowa ricegrass and the white fleabanes.

**Table 77. Locations of lithosols with known populations of Wallowa ricegrass and white fleabanes relative to forest management activities that would be implemented in alternatives 2 and 3**

Previously known sites (FS Site ID)	Ground	Helicopter	Skyline	Thin	Roads
<i>Achnatherum wallowaensis</i>					
616020255	x		x		
616020257	x		x		
616020500		x			
616020501		x	x		
616020502			x		
616020504	x				
616020505					temp rd off 460500
616020506	x	x	x		4600340
<i>Erigeron disparipilus</i>					
616042401				x (Alt 2 only)	
<i>Erigeron engelmannii</i> var.					

Previously known sites (FS Site ID)	Ground	Helicopter	Skyline	Thin	Roads
davisii					
616020243	x		x		
616020244	x				
616020247	x		x		
616021354			x		
616042086	x	x	x (Alt 2 only)	x	4680, 4680219, 4680220
Newly discovered sites					
Achnatherum wallowaensis					
120			X (Alt 2 only)		
121		x	x		
205			x		
206			x		
Erigeron englemannii v. davisii					
5	x				
9			X (Alt 2 only)		
12		x			
13		X (Alt 2 only)			
16	X (Alt 2 only)				
18	x				
24	x	x	x		
Erigeron englemannii v. davisii	Ground	Helicopter	Skyline	Thin	Roads
110	x	x	x		
148		x			
1074				X (Alt 2 only)	
1134				X (Alt 2 only)	
1136				X (Alt 2 only)	
1137				X (Alt 2 only)	
1139				X (Alt 2 only)	

## Aquatic habitat

### Commercial Thinning Activities

Under alternative 2, RHCA buffer widths, as prescribed in PACFISH, would be utilized to protect aquatic and riparian habitats in the LJCRP area (see Design Criteria in Appendix J). These RHCA delineations would occur on Category 1, 2, and 3 streams, ponds and wetlands.

Category 4 RHCAs would be delineated as prescribed by PACFISH, but would have a silvicultural treatment within the RHCA that would be used to maintain and restore RMOs for the Category 4 stream and RHCA. Only those Category 4 RHCAs that are not in old forest structural stage would be treated (approximately 1,822 acres). Those RHCAs that are in old

forest structure are assumed to be at the RMO for sediment and large wood debris recruitment. The silvicultural prescription would be similar to the upslope treatment prescription with the addition of a 25 foot variable width no treatment buffer on either side of the Category 4 stream channel. Mechanical thinning activities, skid trails, and landings would be located outside of RHCAs. Commercial thinning units will be logged using a combination of ground-based and aerial logging systems.

Under alternative 2, commercial thinning activities using mechanical equipment would occur over about 16,666 acres. Ground disturbing activities (i.e. yarding, development and use of skid trails and landings) would be limited to areas outside of RHCAs.

No effect to stream temperature from the Category 4 RHCA treatments would be realized.

With no site specific stand data on category 1 and 2 RHCAs, there will be no harvest treatment proposed in any alternative for those RHCAs, except for Swamp Creek. Any proposed treatment prescriptions for category 4 RHCAs would follow a minimum 25 foot variable width no treatment buffer on either side of the channel. This would provide protection from equipment disturbance to the channel banks and maintain the existing supply of large woody debris to the channel. The treatment outside the no treatment buffer would follow the treatment prescription for the upslope area. The area from 25 to 100 feet is similar in species composition and stand structure, as well as the range of variation, to the upslope area. This treatment would provide the long term stand conditions for the RHCA to provide for the maintenance of the site specific riparian management objectives. This treatment would reduce the influence of uncharacteristic wildfire on stand structure and composition, and potentially reduce the effects of climate change on stand structure (and in-turn stream flow), and the effects of insect infestations on the stand. Additionally, thinning would result in faster growth of residual trees due to reduced competition, thus increasing the size of potential coarse woody debris. In this manner it would provide for resilience to the vegetation in the likely event of future disturbance.

Only 58 acres of Swamp Creek (31 acres of grassland, and 27 acres of upland treatments), in a Category 1 stream (located in upper Swamp Creek), would be treated. These acres would be treated to remove some existing shade producing trees (all trees over 15 in dbh would be left) but in the long term serve to restore the meadow storage capacity thereby reducing water exposure to direct solar radiation and reducing stream temperatures in the long term.

For all other Category 1 and 2 streams, restricting activities to areas outside of RHCAs would prevent adverse impacts to existing stream shading along perennial streams in the aquatic effects analysis area. The RHCA width adjacent to these streams, 300 feet for Category 1 streams and 200 feet for Category 2 streams, are sufficient to prevent removal of trees that provide stream shading. Therefore, measurable increases in stream temperatures would not result from proposed thinning activities.

### *Road Activities*

Fine sediment levels in streams have been shown to increase as the density of roads in a watershed increase (Cederholm and Reid 1987). To access units no new road construction would be needed for the LJCRP. Road reconstruction would need to take place on 82.6 miles of road in the LJCRP area (Table 78). The WEPP-Road Model estimates that soil eroded off the road segments used for haul routes would be unlikely to reach the nearest stream channels (see Physical Scientist's specialist's report).

The road density for both watersheds in the LJCRP area are under the requirements of the 1998 Biological Opinion for Snake River LRMPs for Snake River Steelhead (2 miles per square mile of total roads). There are a number of subwatersheds that contain Snake River steelhead that have elevated road densities (Tables 79 and 80). The higher road densities, which are an indication of fine sediment delivery to fish bearing streams, would have an effect on steelhead and redband trout production. These higher densities are found in three subwatersheds in the LJCRP area.

**Table 78. Miles and acres of road reconstruction and temporary roads by alternative.**

Alternative	Road Reconstruction		Temporary Road Construction	
	Miles	Acres Disturbed	Miles	Acres Disturbed
2	82.6	182	12.6	27.7
3	82.6	182	12.6	27.7

**Table 79. Total Road Density by subwatershed within the Upper Joseph Watershed by Alternative**

Subwatershed Name	Alternative 1		Alternative 2		Alternative 3	
	Total Roads	Total Rd Density	Total Roads	Total Rd Density	Total Roads	Total Rd Density
Broady Creek	53.0	2.50	45.8	2.16	45.6	2.15
Horse Creek	25.4	1.32	15.6	1.32	15.6	1.32
Rush Creek	43.9	1.37	22.8	1.32	23.1	1.33
Lower Cottonwood Creek	7.2	0.69	7.2	0.69	7.2	0.69
Upper Cottonwood Creek	25.8	1.28	25.8	1.28	25.8	1.28
Peavine Creek	26.03	1.38	24.9	1.33	25.2	1.35
<b>Watershed Total:</b>	<b>185.7</b>	<b>1.46</b>	<b>184.6</b>	<b>1.45</b>	<b>184.8</b>	<b>1.45</b>

**Table 80. Total Road Density by subwatershed within the Lower Joseph Watershed Alternative**

Subwatershed Name	Alternative 1		Alternative 2		Alternative 3	
	Total Roads	Total Rd Density	Total Roads	Total Rd Density	Total Roads	Total Rd Density
Cougar Creek	55.4	2.64	54.3	2.59	54.5	2.60
Sumac Creek	54.6	3.21	54.6	3.21	54.6	3.21
Lower Swamp Creek	41.5	1.76	41.5	1.76	41.5	1.76
Davis Creek	33.6	2.90	33.6	2.90	33.6	2.90
<b>Watershed Total:</b>	<b>152.0</b>	<b>1.26</b>	<b>141.9</b>	<b>1.20</b>	<b>143.2</b>	<b>1.20</b>

Temporary roads would be constructed to access commercial thinning units. An estimated 12.6 miles of temporary roads would be constructed. The temporary roads would not be constructed in RHCAs, except at four stream crossings, for a total of 800 feet and 0.027 acres. The temporary roads would be decommissioned following completion of haul activities. Analyses conducted in WEPP indicate a low probability of measurable sediment delivery. (see the Physical Environment supporting documentation).

The combination of road re-construction, temporary road construction and road decommissioning, opening and use of closed roads, and log haul traffic would likely result in an increase in erosion rates in the analysis area. Increases in erosion rates would occur in the short-term and then trend towards background levels. RHCAs would likely moderate much of the increase and the amount of sediment reaching stream channels and would likely result in an immeasurable increase in fine sediment levels (see hydrologist specialist's report).

PACFISH standards and guideline for timber harvest activities and RHCAs were developed to limit impacts to aquatic habitat from timber harvest activities. There is a low likelihood that increases in fine sediment resulting from the proposed timber harvest activities would result in measureable increases in fine sediment in fish bearing streams in the analysis area.

#### *Prescribed Fire Activities*

Burning activities would occur in RHCAs in accordance with Blue Mountains PDCs. The use of backing fires in RHCAs would reduce fire intensities while reducing fuel loading. Reduced fire intensities in RHCAs would 1) reduce the potential for mortality of trees that provide shade, 2) reduce the amount of downed woody material consumed, and 3) reduce the amount of burned area in the RHCAs thus reducing the amount of ground cover loss. Typically, only about 40 to 60% of the area in an RHCA is actually burned due to the use of backing fires and higher fuel moistures. See the disturbance specialist's report for a more detailed description of the expected post-burn conditions.

Majority of the burned areas in RHCAs would be concentrated along the outer edges of the RHCAs where fuel moisture levels would be lower compared to areas closer to stream channels. Prescribed burning would result in a greater area of ground cover consumption in RHCAs adjacent to intermittent streams due to lower fuel moistures levels compared to perennial streams.

The burn prescription would target consumption of woody material 3 inches and smaller with nearly all material in this size class consumed. Therefore, fire severity would not be high enough to consume significant quantities of downed wood that play a role in trapping fine sediment on hill slopes, in intermittent stream channels, and on floodplains. Some ground cover would be consumed but would be quickly replaced as litter fall occurs in the first year following burning and herbaceous plants recover in the second year following burning. A measurable increase in fine sediment in stream channels as a result of burning activities is unlikely due to the combination of a predicted patchy, low severity burn in RHCAs and typical recovery of ground cover within two years of prescribed burning.

Proposed burning activities would result in a low severity fire in RHCAs adjacent to perennial streams in the project area. This would be accomplished by burning when fuel moisture levels are high and allowing fires to back into RHCAs from adjacent upslope areas. These techniques result in low intensity fires that burn in a patchy distribution of burned and unburned areas in

RHCAs. Trees killed by prescribed fire in RHCAs would primarily be understory trees (< 8" dbh). Understory trees of this size typically do not provide significant levels of stream shading.

Few riparian shrubs are also expected to be killed as a result of the proposed burning because they are present in the moister riparian areas. Where the above ground portions of riparian shrubs are killed, they would likely sprout back relatively quickly because the low severity fire will not be hot enough to kill the roots.

The proposed burning in RHCAs adjacent to intermittent streams poses little risk of increasing stream temperatures because these streams are normally dry during the summer and fall months. Based on these factors, the LJCRP is unlikely to result in a measurable increase in water temperature and a degradation of water quality in streams in the aquatic effects analysis area.

*Federally listed species – fish*

Alternative 2 of the LJCRP may affect Snake River steelhead or its designated critical habitat and likely adversely affect the species and its designated critical habitat. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section). This short term increase in fine sediment relative to the existing fine sediment levels would cause the affect to be adverse for listed Snake River steelhead.

*Management indicator species – fish*

Alternative 2 of the LJCRP may impact individual redband trout and their habitat (MIIH), but will not likely contribute toward federal listing or loss of viability to the population or species. Impacts to redband trout may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section).

Alternative 2 of the LJCRP may impact individual Snake River steelhead and their habitat (MIIH), but will not likely contribute toward loss of viability to the population or species. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section).

Current levels of fine sediment in the majority of streams in the analysis area are below the 20% threshold used to indicate adverse impacts to salmonids. In these areas short-term potential increases in fine sediment from proposed prescribed burning and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Most streams in the analysis area currently exceed the 20% threshold offine sediment. Commercial thinning activities are limited to about 1822 acres. Prescribed burning activities would occur in a larger area but the effects relative to sediment will be mitigated by implementation of the project PDCs. Short-term potential increases in fine sediment from proposed prescribed burning and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the LJCRP area.

Impacts from activities proposed under Alternative 2 may result in short-term degradation of habitat for Snake River steelhead and redband trout. However, anticipated immeasurable increases in both fine sediment and water temperature are within habitat tolerances for steelhead and redband trout.

Alternative 2 of the LJCRP may impact individual western ridge mussels and their habitat (MIIH), but will not likely contribute toward federal listing or loss of viability to the population

or species. Impacts to western ridge mussels may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section).

Cumulatively, aquatic habitat should improve over time in the analysis area. Fine sediment levels should decrease through time as a result of improved road closures and decommissioning activities. Alternative 2 may result in a short-term increase in fine sediment resulting from prescribed burning activities.

In the long-term, the proposed action will improve vegetative conditions and maintain the natural fire regime in the project area which will have beneficial impacts to western ridge mussels and their habitat.

## Wildlife

### *Primary cavity excavators*

The vegetation treatments proposed would negatively impact current and future dead and defective wood habitat. Harvest treatment is proposed on about 40% of the forested landscape. It can be assumed that within treatment areas there would be a reduction in snags and logs due to skid trails, landings, safety reasons and prescribed burning. Proposed activities (tree harvest and prescribed burning) are expected to help create habitat for primary cavity excavators (PCEs) that use open forests (e.g. white-headed woodpeckers) and reduce habitat for those PCEs using dense forests (e.g. pileated woodpeckers).

The potential removal of trees  $\geq 21''$  dbh on up to 7,466 acres in alternative 2 may negatively affect the long-term recruitment of snag habitat, as these trees would no longer be available as potential snags (no trees  $\geq 21''$  would be cut in alternatives 1 and 3).

The closing of roads will positively affect the abundance of snag and down wood habitat; therefore alternative 2 would have a less negative impact than alternative 3 because fewer roads would be open to the public. Bate et al. (2007) and Wisdom and Bate (2008), found that snag numbers were lower adjacent to roads due to removal for safety considerations, removal as firewood, and other management activities (Bate et al. 2007, Wisdom and Bate 2008, Hollenbeck et al. 2013).

### *Pileated woodpecker*

Table 65 compares conditions of pileated woodpecker source habitat by alternative. Alternative 2 would maintain source habitat within HRV, but would have lower habitat quality compared to Alternative 1 and 3 since it includes a greater extent of commercial harvests.

Alternative 2 allows for cutting of trees  $>21''$  across about 47% of the area treated (Table 81), where the other alternatives allow none. The loss of large ( $>21''$ ) trees in alternative 2 will more negatively affect pileated woodpeckers and other cavity nesting and large tree dependent wildlife species than alternatives 1 and 3.

Under alternative 2, the abundance of open roads across the planning area would be reduced by 20 miles compared to the No Action alternative. As compared to alternatives 1 and 3, this reduction in the amount of open roads will have the greatest positive impact of any of the alternatives. The potential for removal of snags for firewood and safety will be reduced across the planning area on approximately 20 miles.

Though some current source habitat will be harvested, and the quality of the habitat may be reduced, overall, source habitat will remain within the RV for this species in this project area. Therefore, the LJCRP will not contribute to a negative trend in viability on the WWNF for the pileated woodpecker.

**Table 81. Percentage of treated forest in alternative 2 where trees  $\geq 21$ " could potentially be removed.**

	Harvest acres	Acres with trees $\geq 21$ " potentially removed	% Harvest Area with trees $\geq 21$ " potentially removed
Dry forest PVG	12,509	7,163	45
Moist forest PVG	3,423	303	2
Total Commercial Harvest	15,932	7,466	47

#### *American marten*

The potential removal of trees  $\geq 21$ " dbh on 7,466 acres in alternative 2 may negatively affect the long-term recruitment of snag habitat, as these trees will no longer be available as potential snags and down wood. Also see "effects common to all action alternatives".

Proposed commercial harvest in the moist forests is 3,423 acres, of which 831 acres is within what currently qualifies as marten source habitat (moist – large tree – closed canopy). These 831 acres represent about 38% of the current source habitat for marten in the project area. The design criteria for these prescriptions is to maintain  $>60\%$  canopy closure, and multi-story conditions; and no trees  $\geq 21$ " would be harvested. It is assumed that post-harvest these stands would be maintained as source habitat. It is likely that in the short-term they may meet minimum qualifications as source habitat but the quality of the habitat may be reduced due to reduced complexity and tree density, and potential loss of snags and logs due to logging operations and safety.

As discussed in the PCE section above, densities of large snags ( $>20$  inches dbh) in moist forest are below reference conditions in the snag density classes that provide habitat for American marten (Figure 2). Snag habitat is likely to be a limiting factor for marten in these habitat types. Harvesting on 3,423 acres will add to a reduction in snag habitat, further declining potential and future habitat quality for marten in this area.

In alternative 2 on 114 acres of the marten habitat that is being commercially harvested, is in the prescription 'GS\_Mod' (group selection – moderate). Group selections can include openings that are 1/2-4 acres. Martens respond negatively to low levels of habitat fragmentation (Hargis et al. 1999), it may be that openings as large as 4 acres will reduce the quality of the habitat for marten. In the longer-term, as trees continue to grow, American marten would continue to use these harvested areas for some or all of their life history functions.

The potential removal of trees  $\geq 21$ " dbh on 303 acres of moist forest not currently source habitat for marten in alternative 2 may negatively affect the long-term recruitment of snag habitat, as these trees will no longer be available as potential snags and down wood.

Additionally the harvest of large trees within the moist forest may lead to a delay in development of source habitat and or lower the quality of potential source habitat in the longer term.

The additional road closure of 20 miles proposed in this alternative relative to the No Action alternative would likely benefit marten. Open roads can contribute to a loss of quality of habitat through loss of snags and downed wood due to firewood harvest and safety, and can reduce habitat quality for marten (Godbout and Ouellet 2008).

The vegetation treatments proposed are assumed to modify fire behavior and reduce the effects of a stand replacement event, thereby potentially retaining source habitat in the long-term.

### *Northern Goshawk*

Through harvest under alternative 2, the abundance of source habitat for goshawks would be reduced by 256 acres. The amount of source habitat remains within HRV (1-46%). About 8,200 of the 19,106 acres defined as source habitat will be treated with a variety of harvest treatments. These treatments will result in stands that are  $\geq 15''$  dbh, and a canopy closure of  $\geq 40\%$  in the dry forests, and  $\geq 60\%$  in the moist forests, which meet the definition of source habitat. On approximately 4,000 acres of source habitat that is harvested, trees  $\geq 21''$  dbh may be harvested. Source habitat that has been harvested would likely be of lower quality due to the loss of canopy closure, loss of large trees, and loss of large snags and logs due to safety and logging systems.

Although trees with mistletoe are likely to be removed in all harvest units, especially in the 'Intermediate Treatment' prescription (153 acres), the loss of mistletoe may also reduce the quality of source habitat. The removal of trees with dwarf mistletoe brooms may be detrimental to northern goshawk and other species that nest in mistletoe brooms (Bull et al. 1997).

The closure of an additional 23 miles above existing decision (alternative 1) should benefit northern goshawks, as human disturbance has been documented to negatively affect this species.

### *Rocky Mountain elk*

Table 46 summarizes forest plan standards for road density by management area, and alternative. The HEI standard of  $\geq 0.5$  on MA1 is met in both the Lower and Upper Joseph watersheds. The percent cover on the summer ranges remains above 30%, the forest plan direction, though is reduced to 33% in the Upper Joseph watershed. The reduced cover may increase forage quantity and quality especially in the spring. However, this reduced cover may decrease hiding cover ( $\geq 40\%$  canopy closure), particularly in the Upper Joseph watershed and the entire winter range habitat. In the Lower Joseph watershed, on the winter ranges, the percent cover is reduced to 16% (also see Table 45).

Alternative 2 removes the most area with a reduction of areas in marginal and/or satisfactory cover on in the Lower Joseph – timber emphasis (summer range) on approximately 2,273 acres. Both, harvest treatment and prescribed burning may also contribute an increase in forage quantity and quality, especially in the spring.

Additionally this project would temporarily increase road density in the analysis area by constructing 12.6 miles of temporary roads. Combined with the loss of cover to harvest, there would likely be a short-term negative impact to habitat effectiveness for elk. The post-project road densities would also be above forest plan standards in some subwatersheds. Additionally of concern within the analysis area is the unregulated OHV and full-sized vehicle use of closed

roads, which has been shown to negatively affect elk and elk habitat. Together with the loss of cover and higher road densities particularly in the Davis, and Lower Swamp Creek subwatersheds, elk distribution and habitat effectiveness may be negatively affected.

To reduce disturbance to big game on winter ranges, timber sale activities, including log haul, would be implemented in ways to minimize activities during periods of low temperatures and accumulated snow depths, typically from December 15 through March 31st.

### Old growth management areas, late-old forest habitat, and connectivity corridors

Alternative 2 includes commercial harvest within portions of 11 DOGMAs, on 793 acres (Table 66). Prescribed fire treatments would follow all mechanical treatments. Prescribed fire would also be applied to untreated stands, with dry forest being the highest priority for burning. Thinning treatments would result in an immediate increase in average tree diameter by favoring dominant and codominant trees. The treatments would also increase average tree diameter by reducing inter-tree competition and improving individual tree growth. Table 70 displays the estimated post treatment size class distribution and the percent change from the existing distribution. For both the dry and moist PVGs, tree size class is trending toward larger tree size classes with a nine and seven percent increase respectively in the >20 size class. Treatment within the DOGMAs is primarily in the dry forest PVG (742 acres, with increases in primarily OFMS and UR, with declines in YFMS and SE.) The area in OFSS remains unchanged (Table 44; see Figure 5 for descriptions of structural stages). In harvested areas, the canopy will be reduced, favoring those species associated with more open canopies but the prescriptions would generally maintain canopy closure >40% while also adhering to the direction to maintain old forest characteristics.

Map 7 (Appendix A), and Table 96 shows commercial treatment within LOS and MA15 connectivity corridors for alternatives 2 and 3. Alternative 2 would reduce the quality of connectivity corridors on 4,155 acres by reducing the canopy closure and structural complexity. The prescriptions in the proposed treatment units within the connectivity corridors have been designed to provide canopy closure at  $\geq 40\%$  in the dry forest PVG, and  $\geq 50\%$  in the moist forest PVG. Although canopy closure and structural complexity may be reduced, these stands are expected to maintain the function and objectives of connectivity as described in the Eastside Screens. This level of tree stocking would reduce competition between residual trees, increase tree growth rates, and increase trees' ability to defend against insects and diseases, while retaining levels of canopy closure and structural complexity to facilitate movement of wildlife between LOS habitat patches.

Alternative 2 would allow for prescribed fire across much of the planning area, and 1,214 acres of treatment in seedling/sapling and pole stands within connectivity corridors. Some snags and logs may be consumed by prescribed fire, while new snags and logs are recruited from fire-killed trees. The burning, and small tree thinning in connective corridors will not have a measurable negative effect on the quality or function of the corridors.

### Landbird and migratory bird habitat

Effects from this project to migratory birds would be variable depending on the species. Alternative 2 would harvest more acres harvested and prescribed burned than alternative 3.

Therefore, canopy cover would be reduced more, large trees would be harvested, snags would be reduced more, and riparian areas would be altered. See table 67 .

Road densities will be reduced more in alternative 2 which will likely benefit all of these migratory birds. Road-associated factors that negatively affect some species of migratory and resident birds include: snag and log reduction, habitat loss and fragmentation, negative edge effects, harassment or disturbance, collisions, displacement or avoidance, and chronic negative interactions with humans (Penninger 2009). Also see “effects common to all action alternatives”.

**Table 82. Existing distribution of structural stages in old growth management areas (MA15), and distribution by alternative for the LJCRP area. See Figure 7 for a description of structural stages.**

Existing Condition/Alternative 1/Alternative 3 Designated Old Growth Management Areas (MA 15 Acres)							
	OFMS	OFSS	YFMS	UR	SE	SI	Total
Dry Forest	913 (49%)		142 (8%)	397 (21%)	417 (22%)	0	1,869
Moist Forest	567 (52%)	14 (<1%)	65 (6%)	281 (26%)	174 (16%)	0	1,101
Total DOGMA	1481 (50%)	14 (<1%)	206 (7%)	678 (23%)	592 (20%)	0	2,970
Alternative 2 - Designated Old Growth Management Areas (MA 15 Acres)							
	OFMS	OFSS	YFMS	UR	SE	SI	Total
Dry Forest	1032 (55%)	2 (<1%)	47 (3%)	490 (26%)	296 (16%)	0	1,869
Moist Forest	567 (52%)	15 (<1%)	65 (6%)	315 (29%)	140 (13%)	0	1,101
Total DOGMA	1599 (54%)	17 (<1%)	111 (4%)	805 (27%)	436 (15%)	0	2,970

## The social environment

### Socioeconomics

See table 68 for the area proposed for thinning under alternative 2 over the 10-year span of the LJCRP. No treatments would occur in categories 1, 2 or 3 riparian habitat conservation areas (RHCA), with the exception of Swamp Creek (Category 1 RHCA), or any RHCAs that are currently in an old forest structural condition. Silviculture treatments in category 4 RHCAs (intermittent, non-fish bearing streams) would only be applied where they support attainment of RMOs, and would generally parallel adjacent upland treatments. No trees greater than 21 inches in diameter would be harvested in Management Area (MA) 15. Prescribed burning would occur using planned and unplanned ignitions of natural fuels on up to 90,000 acres based on needs to restore forest resilience. Activities under this alternative, such as timber harvest and restoration, will have economic consequences depicted below. The existing economic conditions related to timber harvest and restoration are depicted above (for example, Table 84 depicts employment and specialization in logging and wood products manufacturing).

### *Financial efficiency*

Table 83 summarizes the financial efficiency for alternative 2. The PNV indicates the financial efficiency of the timber sale and restoration activities, including all costs (that are not included in the stumpage rate) and revenues associated with the activities and required design criteria (information obtained from Timber specialist assigned to the project). Restoration activities examined under this alternative include (among others) resiliency treatments, prescribed fire, and planting (assuming all group selections may potentially be planted, although in practice natural regeneration would be used wherever possible). A 4 percent discount rate was used over a period of 10 years (2014–2023), the estimated time required for full implementation of the project.

Table 83 indicates that alternative 2 is not financially efficient for the timber harvest and required design criteria, as well as for all restoration activities noted above, as indicated by the negative PNV, -\$5.9 million. This addresses the concern of community members that indicated it is important to have product pay for the project and be financially efficient. However, since the PNV does not include non-market values, such as ecosystem services as discussed above, the benefits are likely an underestimate. The estimated costs of treatment are the highest under alternative 2 since the restoration treatments are the most intensive. Therefore, the expected non-market values derived from alternative 2 will likely be greater than alternatives 1 and 3.

Indirect effects on financial efficiency could occur as a result alternative 2, however, estimates of these changes are not available. It is anticipated that fuels treatments under this alternative would contribute to fuels conditions that would have more resistance to wildland fire. This would tend to decrease wildland fire related costs such as property loss, lost revenues and suppression costs.

**Table 83. Present Net Value for alternative 2.**

<b>Proposed Action Alternative</b>	<b>Present Value of Benefits</b>	<b>Present Value of Costs</b>
BENEFITS		
Revenue from commercial timber volume	\$1,940,126	
COSTS		
Non-Mechanical		\$4,576,354
Mechanical		\$1,192,525
Commercial timber harvest		\$2,088,231
Sum of discounted benefits and costs	\$1,940,126	\$7,857,110
Present Net Value	\$(5,916,984)	

### *Economic Impacts*

Alternative 2 results in restoration activities with commercial timber production of 10,400 ccf per year for 10 years; mechanical, pre-commercial, stand treatment on 820 acres per year; 404 acres of restoration treatment by hand labor; and a variety of road projects. Implementation of alternative 2 is projected to support 55 jobs and \$2.9 million in labor income in Wallowa and Union counties annually over 10 years. Those impacts in the local area include the jobs supported directly by completion of restoration treatments and processing of the commercial timber and the indirect and induced jobs related to those activities.

The implementation of alternative 2 would yield employment changes in many economic sectors within Wallowa and Union counties. The greatest number of jobs supported would accrue to the Manufacturing and Agriculture and Forestry sectors. Other sectors affected by the LJCRP include Retail Trade, Construction, Professional Services, and Health Care.

**Table 84. Projected employment by major industry for the proposed alternative**

Industrial sector	Jobs supported
Manufacturing	19
Agriculture and forestry	16
Professional, scientific, and technical services	2
Retail trade	2
Health care and social assistance	2
Accommodations and food services	2
Construction	2
Other industrial sectors (8)	10
Total	55

### *Social Impacts*

In addition to effects on the local economy, activities under the LJCRP have the potential to affect the livelihood, cultural values, and biological values of people in the analysis area. The social consequences are measured qualitatively, with a particular focus on access, recreation uses, environmental justice and non-market values.

### **Livelihood**

The jobs and income, as detailed above under the economic impacts section, that alternative 2 is expected to support would likely improve the livelihood of area residents. These jobs and income are expected to be generated over the next ten years, which is the life of the project. The increase in jobs and labor income in the analysis area from alternative 2 would likely increase the tax base, public services, funding for schools, capital maintenance projects, and reduce poverty. Since the increase in jobs and income is greater under the Proposed Action alternative, the expected increase in the public services will be greater than under the other alternatives.

The tax rates on timber harvested during 2014 under the Forest Products Harvest Tax (FPHT) is \$3.53 per thousand board feet (MBF). The receipts from this tax program are dedicated to the partial funding of state-run programs that promote forest research, fire prevention and fire suppression, forest practices act administration, and improve public understanding of Oregon's forest resources (State of Oregon 2014). However, the funding for schools and other public services are more likely to come from personal income taxes (from 5 to 9.9 percent of taxable income) and property taxes. With increases in labor income, as detailed in the economic impacts section above, the state tax base and therefore public services could also increase.

Additionally, with more jobs and income in the area under alternative 2, there may be more opportunities for younger generations. In turn, youth may choose to stay in the area and improve the age diversity. With a more balanced age composition, the economy will be more sustainable in the long-term.

Commenters raised the issue of access to public lands. Alternative 2 would decommission 23 miles and close 15 miles of roads over the 10-year span of the project and will therefore have a greater negative impact on access to WWNF land compared to alternative 3, which proposes no new decommissioning or closing of roads. Since many community members value access to public lands, alternative 2 would negatively affect this value. In addition to closure of roads, public access could be impacted by short-term increases in traffic but these effects will be intermittent during restoration. The potential increase in traffic is based on treatments in association with the timber sale. Under alternative 2, there are more treated acres, and therefore greater short-term effects to traffic.

### **Cultural Values**

As discussed in the Affected Environment section above, residents in the LJCRP area value the land mostly for recreation uses, such as hunting, fishing, gathering forest products, wildlife viewing and scenery, among others. See the Tribal report for effects to subsistence uses. These recreation uses are also linked to access, as discussed in the previous section. With more roads decommissioned, this limits access to public lands for recreation purposes. Since alternative 2 decommissions and closes more miles of roads than alternative 3, the effects to recreation access will be greater under alternative 2. There could also be intermittent disruption of access to the LJCRP area for treatments and therefore disturbance during hunting season. This effect is greater under alternative 2 than 3 since there are more acres likely to be treated.

Under alternative 2, the positive effects to recreation uses for fishing, gathering special forest products, and hunting are greater in the long term since there will be more restoration treatments and a corresponding lower risk of wildfire. As noted in the wildlife section, prescribed burning in alternatives 2 and 3 would generally benefit elk habitat through forage enhancement. With improved ecosystem services from restoration, this will likely positively impact fish and wildlife habitat, water and air quality and plant diversity for recreation uses by people in the analysis area. As detailed in the aquatics section, there is a low likelihood that the proposed timber harvest activities will result in measureable increases in fine sediment in fish bearing streams in the analysis area that would degrade habitat for redband trout. However, since more treatments are proposed under this alternative, effects to recreational fishing are higher than under alternatives 1 and 3. Alternative 2 may result in a short-term increase in fine sediment resulting from prescribed burning activities. In the long-term, alternative 2 would improve vegetative conditions and maintain the natural fire regime in the project area which will have beneficial impacts to redband trout and their habitat and provide greater opportunities for recreational fishing. However, under the No Action alternative and Alternative 3, negative recreation effects could be greater as the risk of fire is expected to be greater without any or less restoration treatment. For more information on the effects to the specific resources, see the other specialist reports (Aquatics, Wildlife, and Botany analyses).

Vegetation management is needed to return these landscapes to a more natural appearance and higher scenic quality for recreation. More natural, park-like stands, which are substantially less abundant across the landscape than historically, have little likelihood of returning without mechanical restoration treatments to facilitate the reintroduction of fire. Alternative 2 meets the purpose and need to a much greater extent than the other alternatives.

In the short-term, while prescribed burning treatments take place, smoke could affect the ability to recreate and enjoy the scenery in the Lower Joseph Creek area. With more acres to be treated under alternative 2, the short-term impacts are higher than the other alternatives. However, the FS is not planning to burn during peak visitor season so the impacts are expected to be minimal.

## **Biological Values**

Commenters revealed that they value air and water quality, wildlife, and old growth trees, among others. Due to increased restoration under the Proposed Action, improved ecosystem services and decreased risk of wildfire, these biological values will likely be improved in the analysis area. The value for old growth trees is preserved under all alternatives because there is no old growth harvest proposed. Rather than positively impacting this value (it is impossible to increase the amount of old growth trees in the short-term), by not harvesting old growth trees, the value is maintaining its integrity in the community. People will benefit from knowing that the trees exist and are continuing to provide biological services to the forest ecosystem. For more information on the effects to the specific biological resources, see the other specialist reports (Aquatics, Wildlife, and Botany analyses).

## **Timber Market and Forest Products**

Alternative 2 would add timber to the regional supply and is expected to have positive impacts on the current timber market. The timber mills in the area might increase their employment in response to increased supply from the LJCRP. American Forest Resources Council ((AFRC) and Loggers 2014)(Appendix A) estimated that the ten mills in the area are operating at an average of 39 percent capacity and therefore have the capacity to process sawtimber in alternative 2. Contacts from the local logging industry believe that the demand for timber products in the region is expected to increase as the products are shipped around the world. Under alternative 2, this distance and relevant transportation costs could decline as the industry receives more wood from the LJCRP.

## **Non-Market Values**

Under alternative 2, forest health is expected to improve the most compared to the other alternatives. Alternative 2 would also decrease the likelihood of crown fire relative to existing conditions more than the other alternatives. Over time, forest restoration treatments would decrease fuel load and decrease potential smoke emissions from both planned and unplanned ignitions. The proposed activities under this alternative would protect ecosystem services and other social values, such as recreation opportunities and subsistence uses. Therefore, ecosystem functionality is expected to improve and contribute to community members' non-market values the most. For more details on other social values, see the Social Impacts section above.

## **Environmental Justice**

While minority and low-income populations exist in the area, alternative 2 is not expected to have disproportionately high and adverse human health or environmental effects on these communities. The environmental justice communities expected to be impacted the most are within the Nez Perce tribe. Since this community uses the Lower Joseph area for cultural and religious practices as well as for subsistence uses, they are more vulnerable to changes in the area's natural resources due to the LJCRP. In the long-term, alternative 2 is expected to improve natural resource conditions. However, in the short-term, the natural resource uses will be affected the most under the Proposed alternative since it involves the greatest amount of treatment. These effects are addressed in greater detail in the Tribal and Heritage report.

The low income populations in the LJCRP analysis area could be affected by the access to recreation opportunities and resource use. Under alternative 2, 23 miles of roads will be decommissioned and 15 miles of roads will be closed over the 10 year span of the project, compared to no miles of decommissioned or closed roads under Alternative 3. If the low-income populations have to travel greater distances to access recreation, they could incur extra costs

since it is more expensive to reach the forest in indirect ways. However, decommissioning 23 miles and closing 15 miles of roads is not expected to have significant and disproportionate effects on these communities.

Through public meetings, community members and representatives expressed that they expect the LJCRP to improve current environmental justice conditions, specifically related to low-income and children populations. With increased job opportunities for parents, they will be able to provide better opportunities for their children and the expected increase in the tax base under alternative 2 would presumably provide more support for schools. An increase in the tax base could also potentially increase social services for low-income populations and help alleviate poverty.

### Heritage.

Eligible and unevaluated sites are known to be located in, or within 200 feet of treatment unit boundaries. Potential effects will be mitigated via monitoring and site protection design features that will be implemented prior to ground disturbance.

The greatest threat to heritage resources is ground disturbing activities associated with mechanical treatments. Alternative 2 mechanically treats 42% more area than Alternative 3 (see Tables 66 and 89)

Mechanical treatments involve ground based, sky line and helicopter logging systems that include skidding, yarding construction of temporary roads and landings. Impacts to undiscovered sites could include rutting, erosion, dislocation, or breakage of artifacts and features, and destruction of sites and site stratigraphy.

Harvesting trees greater than 21" within old growth areas or IRAs has the potential to impact historic features such as cambium peeled trees and dendroglyphs. In addition, Inventoried Roadless, Riparian Habitat Conservation and Old Growth Management areas may be more likely to contain buried sites with high archaeological integrity due to less past management and ground disturbance.

For both alternative 2 and 3, large scale prescribed fire treatments will be implemented over several years. The majority will entail hand treatment. However, prescribed fire does have the potential to affect fire sensitive sites, and ground disturbance associated with fire lines may occur. Initial reduction of heavy fuels may lead to an increase in site visibility, public visitation, and possible vandalism. These issues would be reduced through management actions that include project specific as well as long-term monitoring. Initial entry prescribed burns would be periodically revisited and burned to reduce natural fuel accumulation, and archaeological site monitoring would be part of that process

These potential effects will be addressed through site avoidance and monitoring strategies by implementing the site protection measures listed in the "Pacific Northwest Region Programmatic Agreement between the R6 Forest Service and the Oregon State Historic Preservation Office" (2004citation).

Low intensity prescribed fire could be a benefit to heritage resources as it will reduce current fuel loads which would then assist in preventing extensive heat damage during wildfires. There would be less need for fire suppression activities, consequently reducing the threat of ground-disturbing activities like bulldozer fire line construction and include a reduction of unnatural fuel loading in and around heritage site where high ground temperatures adversely affect

archaeological values. In addition, uncharacteristic fire behavior should also be reduced resulting in less overall risk to heritage sites.

## Tribal

### *Impacts on hunting, fishing and gathering and resource risks of accelerated restoration*

The Tribe believes the risk to treaty resources and their habitats resulting from an accelerated pace and scale of restoration is high; especially where treatments involve mechanical operations used for timber harvest. In addition, decommissioning of 23 miles of roads is viewed negatively by those tribal members who believe decommissioning may restrict access to treaty resources. On the other hand, some tribal members view decommissioning positively if it restores resource values such as water quality.

Conflict remains regarding attitudes concerning needs for the conservation of treaty resources. Effects from accelerated restoration on hunting, fishing and gathering, as encompassed by the activities proposed in alternative 2, would be positive as treatments are expected to promote landscape resiliency and move treaty resource conditions closer to HRV.

### *Concern for value of landscape over economic values*

The Tribe believes that economic values often drive forest management projects, including the LJCRP, at the expense of landscape resource values. The estimated economic net value from timber harvest for Alternative 2 is -\$5.9 million, demonstrating that positive economic net value is not a motivation for this alternative to be the preferred alternative.

Based on the estimation that alternative 2 is projected to support 55 jobs and \$2.9 million in labor income in Wallowa and Union counties annually over 10 years, the economic worth of Alternative 2 on Wallowa County communities would be positive. However, economic benefits to Nez Perce tribal members would likely be neutral as most tribal members live outside Wallowa County (see Socioeconomic Specialist Report).

### *Maintain old growth legacy trees and conserve inventoried roadless areas*

Vegetation treatments proposed in alternative 2 in designated old growth (MA15) and IRAs would likely be considered a negative effect to the tribe. While there may potentially be unanticipated adverse effects of mechanical thinning in old growth and roadless areas, there is conversely the risk of losing old trees to uncharacteristic fire if these treatments are not done. These treatments assume that mechanical disturbance of these systems for the purposes of restoring the RV in structure and composition would result in greater beneficial than adverse effects. Protection of the “largest of the large” trees across 793 acres of ground may pose higher risk to legacy trees.

Short term impacts to the forest setting would be evident. However, long term benefits from maintenance of all old trees, and increasing stand resilience may be realized as a positive effect.

### *Impacts to traditional plant resources*

Eight of the twelve traditional plants listed in Table 48 are either fire dependent, respond well to low intensity fire, and/or are at low risk from fire due to location in rocky habitats or seasonal timing of the establishment of the tap root.

Proposed prescribed burning, thinning of hazardous fuels and/or meadow or riparian encroachment, where ecologically appropriate, would reduce fuel loads, increase understory productivity and diversity of many traditional plants, and allow fire to perform its natural ecological role. In addition, 741 acres of savanna and grassland habitat will be restored, benefiting plants including Indian Hemp, Balsam Root, Lily, Camas, Bitter root and various Lomatiums, including “cous”.

Indirectly, since most of the plants in Table 48 are early to mid-successional and/or shade-intolerant, alternative 2 would improve plant habitat by opening stands and removing fuels. On the other hand, yew and currant (*Ribes* spp.) are affected negatively by canopy opening but could be protected through the development of design criteria (See Botany Specialist report).

Overall, alternative 2 is expected to have a beneficial effect to traditional plants and their habitats. This positive response would not be realized if plant structures, seeds, and habitats are put at risk from severe or intense fire. Ability to withstand or benefit from fire depends on the species-specific response, prescribed burn technique, burning season, and environmental factors.

Most of the plants in Table 48 have probably not benefited as a result of past actions that removed large overstory trees from the stand and promoted growth of numerous small trees and accumulation of litter and woody fuels. While alternative 2 alone cannot entirely correct the current condition, it is expected to improve habitat for understory plants while the No Action Alternative poses greater risk to plant habitat.

#### *Traditional cultural properties, sacred sites, and other traditional use areas*

In the long term, compared to No Action and Alternative 3, Alternative 2 may have more potential to protect traditional use area values from stand replacing fire and other unplanned disturbance. However, in the short term, the 42% higher treatment acres as compared to alternative 3 poses a higher level of risk for direct mechanical effects on use areas, settings, and traditional cultural properties.

Implementation of design criteria (Appendix J) and implementation plans would be used to mitigate adverse effects.

### **Recreation**

See effects common the all action alternatives.

Approximately 21 more miles of road would be closed in alternative 2 as compared to Alternative 1. Road closures proposed in alternative 2 would increase the recreation opportunities that are free of motor-vehicle disturbance of noise and vehicle interactions for hikers, mountain bikers, and stock users. Whereas, additional road closures would decrease vehicle access to some dispersed campsites, wildlife viewing sites, and firewood opportunities. Whereas, additional road closures would decrease access to some dispersed campsites, wildlife viewing sites, and firewood opportunities, road closures would have mixed effects on activities such as mushroom pickers, as some prefer areas without the interference of roads while others prefer the convenience of roads nearby.

### **Scenery**

Scenery effects are presented by viewshed, below. Overall, Alternative 2 would move stands toward desired future conditions, and reduce the risk of uncharacteristic fire, while keeping effects to scenic integrity at a high level. Alternative 2 would treat 22 percent of the project area

(39% of forested acres), which would improve scenic stability from low (dry forest PVG) or moderate (moist forest PVG) to high stability, largely by reducing the risk of uncharacteristic disturbance. The appearance of the stands would be improved by making them appear healthier. This treatment would create stumps, and slash, and soil disturbance would be visible from foreground views. These effects would be minor within the first one to two years. As regrowth of shrubs and grasses occur these effects would be significantly reduced. This treatment would not create openings that area visible from middleground or background distances. The effects of this prescription would not reduce the scenic integrity of the viewshed as they are expected to be negligible within 2-3 years. These prescriptions would improve the scenic character by moving stands toward the historic range of variability. More open stands of species compositions that are more fire resistant will improve the scenic stability. The treatments that reduce ladder fuels indirectly reduce flame lengths when a fire does occur. These treatments would indirectly affect the size and severity of fire events thus reducing the effects to scenery resources. It is expected that it would be much more likely that effects of fires in this area would remain within the size and severity characteristic to the historical range.

Alternative 2 would reduce the high amount of open road densities by closing some open roads and decommissioning X already closed roads. Road maintenance would bring existing roads to a minimum maintenance standard. Numerous closed roads would be temporarily opened for commercial material access and removal and re-closed after harvest operations are complete. Also see effects common to all action alternatives.

### **Oregon State Highway 3, Joseph Canyon Overlook**

The immediate foreground (up to 300' distance zone) and FG (up to ½ mile distance zone) of the Oregon Highway 3 travel route is highly sensitive for any new visual impacts, maintaining large trees along the travel route, and the foreground, middleground, and background visible from the Joseph Creek Overlook. Alternative 2 would increase visibility into stands along the eastside of Oregon Highway 3 in limited cases through single tree selection, savanna treatments, and stand improvement by removing trees in the foreground, enhancing large tree character, opening up the mid canopy, and creating greater foreground diversity. The landscape slopes down from highway 3 to the east, so visibility of treatment units would be limited to the immediate foreground, if at all. The commercial thinning treatments would leave the pine and larch species that have the desired large tree character, and greater fire resiliency. This effort would improve the scenic character and the scenic stability of the area. Landscape character changes would be seen as thinned out stands of trees and a more open forested canopy character. Alternative 2 would improve species composition, stand density, and reduce ladder fuels and canopy closure.

One unit (#193) is partially in the background view of Highway 3 (50 acres within the visual quality objective of retention). Restoration treatments include low intensity single tree selection and intermediate treatment, and would not change the density class of the stands. These treatments would not be visibly evident from the Joseph Canyon Overlook.

No roads would be decommissioned in foreground, middle ground, or background visible from Oregon Highway 3 or the Joseph Canyon Overlook.

### **Joseph Canyon Wild and Scenic River Corridor**

The Joseph Creek Wild and Scenic River (WSR) corridor is highly sensitive for any new visual impacts. The visual quality objective of the river corridor is Preservation. No treatments would occur in the river corridor, except the use of planned and/or unplanned fire, consistent with natural fire frequency and intensity. One forest restoration unit (#193) is partially in the

middleground view of the WSR (50 acres) with a visual quality objective of retention. These restoration treatments include low intensity single tree selection and intermediate treatment, and would not change the density class of the stands. These treatments would not be visibly evident from the WSR, or the Swamp Creek or Joseph Creek trails.

In the middleground view, with a visual quality objective of Partial Retention (in the Table Rock area), there would be 684 acres of restoration treatments. Sixty percent (403 acres) of these treatments would be intermediate, non-commercial (stand improvement), or savanna treatments, and 40% (281 acres) would be single tree selection treatments. All of these treatments would maintain structural diversity and the natural mosaic landscape character, and appear unaltered to slightly altered in the short-term, and unaltered in the long-term when viewed from the WSR. The single tree selection treatments would leave the pine and larch species that have the desired large tree character, and greater fire resiliency. This effort would improve the scenic character and the scenic stability of the area. Landscape character changes would be seen as thinned out stands of trees and a more open forested canopy character. Alternative 2 would improve species composition, stand density, and reduce ladder fuels and canopy closure.

### **Table Mountain**

Table Mountain has been identified as a valued place by local residents to view scenery. Alternative 2 would increase visibility into stands along FS Road 4650, and 4650120 through 4650170 through single tree selection, intermediate, savanna, and stand improvement by removing trees in the foreground and middleground, enhancing large tree character, opening up the mid canopy, and creating greater foreground diversity. Sixty percent (403 acres) of these treatments would be intermediate, non-commercial (stand improvement), or savanna treatments, and 40% (281 acres) would be single tree selection treatments. Over the long-term, all of these treatments would maintain structural diversity and the natural landscape mosaic, improve the scenic character and the scenic stability of the area, and appear slightly altered in the short-term when viewed in the middleground.

One unit (#193) is partially in the background view of Highway 3 (50 acres within the visual quality objective of retention). Restoration treatments include low intensity single tree selection and intermediate treatment, and would not change the density class of the stands. These treatments would not be visibly evident from the Joseph Canyon Overlook.

No roads would be decommissioned in foreground, middle ground, or background visible from Table Mountain. There would not be any new roads that would result in introducing new linear corridors in the viewshed.

### **Forest Road 46, Cold Spring Ridge/Forest Road 4680**

Forest Road 46 is the main travelway through the project area, from Oregon Highway 3 to Cold Spring Ridge within HCNRA. It has a visual quality objective of Partial Retention in the foreground, and generally Modification in the middleground. All treatments proposed in the foreground, middleground and background along this travelway (single tree selection, group selection, intermediate, savanna, and stand improvement) would meet Partial Retention visual quality objectives. One small portion of the middleground on the western side of Cold Spring Ridge, within the Inventoried Roadless Area has a visual quality objective of Partial Retention in the middleground. In alternative 2, only stand improvement treatments would occur in this area, and would only slightly alter the appearance in the short-term. Over the longer-term, scenic integrity and stability would be improved throughout this viewshed.

There would be decommissioned roads located off Forest Road 46 in the foreground and middle ground of this viewshed (FS Roads 4600425, 447, 555, 570, 572, 574, 575, and 578).

Decommissioning roads would improve scenic integrity by restoring the landscape back to a more natural appearing character by reducing linear corridors and allowing vegetation to become reestablished. There would not be any new roads that would result in introducing new linear corridors in the landscape.

It is expected that alternative 2 would not reduce the scenic integrity and retain the existing visual quality objective standards established in the Forest Plan, CMP (HCNRA) and the Imnaha Wild and Scenic River Management Plan.

### *Inventoried Roadless Areas*

To address the extent of the effects, acres will be used. Table 85 summarizes the acres treated in each IRA. There would be no temporary road construction proposed within the IRA under Alternative 2.

**Table 85. Acres of harvest and stand improvement treatment by IRA in Alternative 2.**

IRA Name	Acres of harvest in proposed action	Acres of stand improvement (SI) proposed action	Acres prescribed fire proposed action (high priority)
Joseph Canyon	699	260	8,600
Wildhorse	2,118	2,167	8,900
Cook Ridge	37	207	400

### **Maintaining or Restoring the Characteristics of Ecosystem Structure**

Proposed treatments within IRAs are designed to create landscape resiliency by using reference landscape conditions as a guide for forest vegetation (structure, density, composition) and pattern, thus providing for a reduction of wildfire behavior that is closer to natural disturbance regimes for this area. Prescriptions are designed to move the stands closer to historic structure and composition and reduce fire behavior such that planned and unplanned ignitions can be more effectively managed to reduce the potential loss of roadless area characteristics regardless of ignition source.

The direct effect of harvest and stand improvement under Alternative 2 would be to increase the distance between tree crowns, reduce density of fire intolerant species that would likely serve as ladder fuels, reduce ground fuel loads, and allow fire to perform its natural ecological role within and outside of silvicultural treatment areas.

Fuels associated with silvicultural treatments (activity fuels) would be treated with a suite of available tools including, but not limited to, mastication, removal, pile and burn (hand or grapple), cutting and scattering limbs, or prescribed fire.

Implementing the targeted silvicultural actions described in Alternative 2 within IRAs would create opportunity for fire managers and line officers to use more benign approaches to fire

suppression and manage undesirable fire behavior that potentially places roadless area characteristics at risk.

### **Maintain or Improve Roadless Area Characteristics**

Treatments within IRAs are designed to more closely represent historic stand structures and disturbance regimes, reduce adverse fire effects, and/or increase the ability and decision space to manage characteristic fire or reduce the adverse effects of an uncharacteristic fire that threaten roadless area characteristics. Treatment areas provide a larger range of options for fire managers to assess fire's affect to IRA characteristics in terms of suppression tactics or managing unplanned ignitions to maintain or improve roadless area characteristics. The impacts of large fires with uncharacteristic severity, intensity, or extent have the potential to negatively impact roadless characteristics because the effects are outside of reference landscape conditions (PNW-GTR\_315 as an example, FPR IRA characterization in project record). Reducing the potential for these events through silvicultural treatments designed to represent historic stand structure and disturbance patters will help maintain the presence of these characteristics.

### **Generally Small Diameter**

Within IRAs, Alternative 2 proposes prescriptions that include harvesting and stand improvement along with recognition that fire is an important tool for restoration of reference conditions and landscape resilience. The biological environment regarding vegetation and disturbance describes these prescriptions in detail. Collection of stand level data to determine the change in quadratic mean diameter (QMD) is occurring in September and the data will be incorporated as soon as it is collected. This data will be analyzed to show that the prescriptions increase the overall QMD within the treated stands by IRA. Tables 82-84 show the existing QMD compared to the post-treatment QMD.

### **Cutting, Sale, or Removal of Timber is Infrequent**

The purpose of this project is to enable the dominant forest regulatory process (fire) to function naturally while enhancing and maintaining roadless area characteristics. Cutting, sale, or removal of timber under Alternative 2 is expected to allow a broader more informed decision process to occur in regards to overall fire management in this fire dependent system. The previous time there had been cutting, sale, or removal of timber in Wildhorse or Cook Ridge IRAs was following the Teepee Butte fire in 1988 and fire salvage harvest occurred. It has been approximately 26 years since this activity has occurred and that would be considered infrequent. Proactive restoration could facilitate natural regulation of forest structure, reducing future needs for mechanical treatments in these areas, and reduce the incidence of uncharacteristic fires and the need for salvage treatments

### **Joseph Canyon IRA**

Under Alternative 2, 699 acres of harvest and 260 acres of stand improvement would occur. This equates to approximately 4% of the IRA being managed with some type of cutting, sale, or removal of timber. Alternative 2 improves fire resiliency of these stands and decreases the risk of uncharacteristic fire effects through reduction of density and fuel ladders on these acres and the inclusion of managing planned and unplanned ignitions throughout the project area (8,600 acres of high priority prescribed fire is identified for the Joseph Canyon IRA). This helps to restore reference conditions especially allowing fire to perform an ecologically important role in forest and grassland systems both directly to the treated stands and within the entire IRA.

As indicated above, the intent would be to leave a larger QMD following treatment under Alternative 2 by removing generally small diameter trees. Stand data is currently being collected in the field in IRAs in the LJCRP area. The FEIS will include results of these surveys relative to current, and projected post-treatment QMD.

### **Cook Ridge IRA**

Under Alternative 2, 37 acres of harvest and 207 acres of stand improvement would occur. This equates to approximately 1% of the IRA being managed with some type of cutting, sale, or removal of timber. Alternative 2 improves fire resiliency of these stands and decreases the risk of uncharacteristic fire effects through a reduction of density and fuel ladders on these acres and the inclusion of managing planned and unplanned ignitions throughout the project area (400 acres of high priority prescribed fire is identified for the Cook Ridge IRA). This helps restore reference conditions especially allowing fire to perform an ecologically important role in forest and grassland systems both directly to the forest stands and the within the entire IRA.

As indicated above, the intent would be to leave a larger QMD following treatment under Alternative 2 by removing generally small diameter trees. Stand data is currently being collected in the field in IRAs in the LJCRP area. The FEIS will include results of these surveys relative to current, and projected post-treatment QMD.

### **Wildhorse IRA**

Under Alternative 2, 2,118 acres of harvest and 2,167 acres of stand improvement would occur. This equates to approximately 21% of the IRA being managed with some type of cutting, sale, or removal of timber. Alternative 2 improves fire resiliency of these stands and decreases the risk of uncharacteristic fire effects through reduction of density and fuel ladders on these acres and the inclusion of managing planned and unplanned ignitions throughout the project area (8,900 acres of high priority prescribed fire is identified for the Wildhorse IRA). This helps to restore reference conditions especially allowing fire to perform an ecologically important role in forest and grassland systems both directly to the treated stands and within the entire IRA.

As indicated above, the intent would be to leave a larger QMD following treatment under Alternative 2 by removing generally small diameter trees. Stand data is currently being collected in the field in IRAs in the LJCRP area. The FEIS will include results of these surveys relative to current, and projected post-treatment QMD.

### ***Potential Wilderness Areas***

Direct effects are those that would occur immediately following activity at the stand scale, while indirect effects are those that would occur in the future both at the stand and Potential Wilderness Area scale.

The Joseph and Wildhorse PWAs would be affected under Alternative 2. Table 86 shows affected acres in Potential Wilderness Areas.

**Table 86. Affected acres in Potential Wilderness Areas.**

Potential Wilderness Areas	Acres within Lower Joseph Project Area	Alternative 2 Proposed Acres		Remaining Area Meeting PWA Criteria*
		Harvest	SI	
<b>Joseph</b>	6,481	70	0	6,411
<b>Wildhorse</b>	15,409	1,633	366	13,776
<b>Total</b>	21,890	1703	366	20,187

Stand improvement and prescribed burning would generally be substantially unrecognizable to the general forest visitor as managed acres. The nature of these treatments would only leave small stumps that would deteriorate or be covered by forest vegetation in a relatively short amount of time. For this analysis it assumed that SI and prescribed fire treatments would not affect the area from future consideration as potential wilderness.

Harvest treatments generally involve implementation of the Individuals, Clumps, Openings (ICO) method of harvest creating heterogeneity in these areas. Stumps and skid roads would remain visible for a longer period than those associated with SI. Harvest would result in reducing the area meeting PWA criteria per FSH 1909.12, Chapter 70.

No temporary roads would be constructed in PWAs under any alternative; therefore, there would be no effect due to temporary road construction to areas meeting PWA criteria.

#### *Other Undeveloped Lands*

Direct effects are those that would occur immediately following activity at the stand scale, while indirect effects are those that would occur in the future both at the stand and other undeveloped lands scale.

Harvest would occur on approximately 6,577 (1,297 in IRA and 6,577 outside IRA) acres of other undeveloped lands under Alternative 2. Stand improvement would occur on approximately 728 acres (379 in IRA and 349 outside IRA) of other undeveloped lands under Alternative 2. Management of planned (prescribed fire) and unplanned ignition would occur on approximately 17,915 acres identified as high priority for treatment.

#### *Social values (apparent naturalness, degree of solitude, sense of remoteness)*

Proposed harvest and stand improvement activity in other undeveloped lands would create stumps which would reduce the size of undeveloped polygons. The lands would appear managed and developed. This effect would be less noticeable and for a shorter duration in stand improvement treatments due to the general small size of material treated. Prescribed fire in general would maintain the character of natural disturbance therefore it is assumed there would be minimum effect due to managing fire in these areas.

The sights, sounds, and changes in vegetation from activities and use would further decrease the apparent naturalness and sense of solitude within harvest units and along roads during logging operations. All treated stands would remain forested and skid trails, stumps, and landings would be evident. Impacts to social integrity and sense of naturalness would likely be evident until stumps, skid trails, or temporary roads are no longer substantially recognizable (approximately 75 – 100 years, maybe less considering the character of younger trees, dependent upon deterioration of stumps due to decay or fire). The sounds of machinery from activity would reduce the sense of naturalness and solitude during implementation but would not persist in the

long term. Other impacts, such as tree marking paint and logging slash would be visible in the short term (5 to 10 years). Impacts such as skid trails and tree stumps would be evident for a longer period. The increased number of stumps and reduced stand density would likely be the most apparent visual change resulting from implementation.

*Change in acres of other undeveloped lands*

The character and intrinsic value of other undeveloped lands outside of treatment units under Alternative 2 would retain those characteristics (physical, biological, and social values) as described in the affected environment. They would remain free of developments such as skid trails, temporary roads, or harvest created stumps.

All 6,944 acres of other undeveloped lands identified for harvest or stand improvement would continue to not meet PWA inventory criteria. Table 87 is a summary of changes in acres for other undeveloped land in Alternative 2. Table 88 shows the change in size class distribution for other undeveloped land in Alternative 2.

**Table 87. Change in acres of other undeveloped land in Alternative 2.**

	<b>Acres of Other Undeveloped Land</b>	<b>Acres affected by Harvest or SI</b>	<b>Acres Remaining</b>	<b>Percent Change</b>
IRA	16,054	1,676	14,378	-10%
Non-IRA	24,865	5,268	19,597	-21%

**Table 88. Change in size class distribution acres of other undeveloped land in Alternative 2.**

<b>Number of Polygons</b>		<b>Size Class</b>	<b>Approximate Acres</b>	
<b>Existing</b>	<b>Alternative 2</b>		<b>Existing</b>	<b>Alternative 2</b>
253	246	1 to 99 acres	3,826	3,133
30	25	100 to 499 acres	5,747	5,325
7	6	500 to 999 acres	5,249	4,182
11	9	1,000 to 4,999 acres	26,097	21,335
0	0	5,000+ acres	0	0
301	289	<b>Total</b>	40,919	33,975

*Areas identified as Unroaded by Environmental Organizations (UEO)*

Direct effects are those that would occur immediately following activity at the stand scale, while indirect effects are those that would occur in the future both at the stand and areas identified as unroaded by environmental organizations scale.

The effects to the 44,119 acres of UEO that intersects Forest Service Inventoried Roadless Areas are similar to that disclosed in the IRA section. Likewise the effects to the 21,836 acres of UEO that intersect areas that meet Potential Wilderness criteria are disclosed in the PWA section. An additional 30,069 acres intersect the Forest Service's identification of other undeveloped land and the effects to those areas are disclosed in the Other Undeveloped Land section. Table 57 shows the acres of harvest and stand improvement within the UEO. The change in acres for the

remaining 6,821 acres of UEO is shown in Table 89 as well as the acres affected by past harvest or existing road influence areas (approximately 300 feet either side of system roads). After consideration of past harvest and the Forest Service's road influence area there is only 7 acres of UEO disbursed in very small polygons of what could be considered outside the effects disclosed in other sections of this document. Areas that contain past harvest or system roads would not be considered for Potential Wilderness Area and will remain unavailable for the duration of the LJCRP.

**Table 89. Change in acres of areas identified as unroaded by environmental organizations (UEO) and influence of past harvest and system roads.**

Environmental Organizations Unroaded Area Name	Acres outside of IRA, PWA, and other undeveloped land	Acres outside (IRA, PWA other undeveloped land) intersecting past harvest (1974 – 2009) FACTS Database	Acres outside (IRA, PWA, other undeveloped land and past harvest) intersecting 300' road influence zone	Acres outside treated with Harvest/SI – Alternative 2	
				Harvest	SI
Joseph Canyon	4,628	3,761	6	1,480	500
Cottonwood Creek – Broady Creek	1,456	850	1	376	211
Sumac Creek	235	13	0	50	0
Yew Wood Springs	329	127	0	170	1
Boner Gulch	173	26	0	46	0
Total	6,821	4,778	7	2,122	712

## Cumulative Effects

### Air Quality

Past harvest, fuels treatments, prescribed fire and wildfire has occurred over the past 10 years. These past treatments generally reduced forest fuel loading and altered their characteristics such that wildland fire would behave more similar to what would be expected under a natural fire regime. The cumulative effects of these past treatments would serve to reduce the amount of particulates released into the atmosphere. Ongoing activities such as cattle grazing and fire suppression alter the natural disturbance regime allowing increased fuel accumulation (fire suppression and grazing) or a re-arrangement of fuels such that the area burned would be different than historical (grazing).

Air resources are somewhat unique in that past impacts to air quality (past wildland fire or prescribed burns) are usually not evident. Smoke emissions during the spring and fall months primarily result from Federal prescribed fire activities in northeast Oregon and western Idaho. Federal land managers currently coordinate to manage the cumulative effects of prescribed burning across these ownerships. Private landowners also treat fuels on their property and

activities are coordinated with Oregon Department of Forestry subject to the Department's smoke management rules.

Other sources of emissions come from summer wildfire, agricultural burning, and home heating around local communities. Wildfires and agricultural burning typically coincide in mid to late-summer. Home heating is normally limited to winter months. These occurrences generally produce small additive emissions and are not expected to impact air quality at the time prescribed fire activities are planned.

## Vegetation

Alternative 2 restoration treatments would contribute an additional 21,967 acres toward moving forest composition, structure, density toward desired conditions or enhancing forest pattern or size class distribution or improving trends in insect and disease susceptibility.

## Disturbance and Fire Regime

Past harvest, fuels treatment, prescribed fire and wildfire have influenced the character of the natural fire regimes found in LJCRP. In general each of these activities helped shape the affected environment and existing conditions for this project area, along with past grazing and fire suppression. In general the cumulative effect of past harvest (assuming that it was not overstory removal of early seral species) have served to promote restoration objectives by predominantly reducing density and associated mortality effects. In some cases group selection was used as a harvest method which would facilitate the ability of early seral regeneration. Fuels treatments and prescribed fire are targeted to reduce the probability of high severity fire and restore natural disturbance regimes. Wildfire is generally of higher severity than the natural regimes, except for the case of non-forest areas within the project, therefore wildfires influence often further departs from the range of variability of forest structure, density, and composition by simplifying at multiple scales (landscape and stand).

The treatments proposed in the LJCRP in conjunction with past beneficial and past adverse treatments would promote the re-introduction of fire at a natural and ecologically appropriate scale and severity.

## *Fire Management Decision Space*

Past management actions and wildfires cumulatively affect fire managers' ability to confidently return fire as an ecological process. Utilizing areas of reduced fire behavior, typically identified by past treatment and wildfire, can often decrease the risk (safety, social and ecological) of allowing an unplanned ignition to perform an ecologically important role and restore a natural disturbance regime. These past actions alongside treatments identified in Alternative 2 would facilitate the increased acceptance of characteristic wildland fire and its ecological role in restoring disturbance processes in the LJCRP area.

## Wildlife

The vegetation treatments proposed in alternative 2 would negatively impact current and future dead and defective wood habitat to a greater degree than alternative 3. The thinning and fuels treatments proposed, are additive to other similar projects in the larger cumulative effects area. These treatments add to the needs for hazard tree falling along roads and will alter or remove dead and defective wood habitat.

## Physical Environment

The actions proposed in Alternative 2 would have the potential to contribute to the cumulative adverse effects to water quality, water quantity, site stability and site productivity. However, these potential contributions, as discussed previously in the effects analysis, are unlikely to be measurable beyond the site scale. The magnitude of the existing disturbance in the analysis area due to high road densities, livestock management and grazing greatly diminish the potential influence of the proposed management. Furthermore, the proposed management in Alternative 2 will improve the physical environment by reducing road densities, improving the capacity at 6 compromised stream crossings, decompacting legacy management soils impacts and mitigating sources of road sedimentation through road maintenance activities. Future vegetation management through fire will occur and will have the potential to have direct adverse effects to the physical environment. However, effective fire management and the implementation of Best Management Practices and Project Design Features will mitigate much of the direct effects and will reduce the probability of uncharacteristic disturbance events. The proposed mechanical vegetation management activities will facilitate the effectiveness of future fire management. There is no additional programmed harvest or mechanical vegetation management activities within the LJCRP analysis area and new permanent roads will be constructed in the reasonably foreseeable future. The implementation of Alternative 2 will reduce adverse cumulative effects to the physical environment and the risk of future adverse effects.

## Socioeconomics

**Access:** Effects to access to WWNF land was an issue brought up through public comments and meetings. The attitude towards the LJCRP from a subsection of the community is generally negative because, although it may not contain significant access restrictions, the LJCRP is seen as an addition to the previous restrictions put in place and is viewed as a trend towards limiting access to public lands. Travel management planning on the WWNF is on-going and this could change cross-country travel and the existing network of roads on the Forest. If some roads on the WWNF are closed in the future for cross-country travel, commenters expressed that the value of maintained roads would increase. Under alternative 2, the cumulative effects on access to FS lands are greater than the effects from Alternative 3 since 23 miles of roads would be decommissioned and 15 miles would be closed.

**Treatment and Restoration:** The effect of past, present and reasonably foreseeable treatment activities in the project area would improve forest health relative to existing conditions even without the implementation of LJCRP. According to the vegetation report, from 2004 to 2013, approximately 1,320 acres have been commercially harvested in the Lower Joseph area. Under alternative 2, 15,925 acres are expected to be commercially harvested over the ten year span of the project. Under alternative 2, the activity in the forest sector would be higher than the present situation and the associated local economic impact of current and future restoration activities would increase from the present conditions. The estimated employment and income consequences of non-LJCRP treatment activities, therefore, are likely underestimated in the related environmental compliance documents if they depend on present conditions for those analyses.

The LJCRP treatments and other ongoing and foreseeable treatments could increase exposure to smoke emissions, which could cause cumulative effects to health and quality of life for individuals who are sensitive to smoke. According to the vegetation report, from 2004 to 2013, approximately 592 acres have been broadcast burned and 23,752 acres have incurred wildfire in the Lower Joseph area. Under alternative 2, up to 50,000 acres are expected to be broadcast

burned over the ten year span of the project. However, the cumulative effect of these treatments would be to decrease the risk of uncharacteristic wildfire, which would decrease the probability of smoke emissions associated with these events.

Recreation: Other on-going and reasonably foreseeable vegetation treatments in the project area would reduce the opportunities for substitute behavior when the preferred recreation site is unavailable. As a result, individuals may choose to stay home, which would decrease visitor spending and consumer surplus to a greater extent than estimated in the direct and indirect effects analysis. However, the cumulative effects to the social and economic impacts from recreation cannot be precisely described. Based on the available information, the effect to visitor spending and consumer surplus from on-going and reasonably foreseeable actions is not expected to change. Although alternative 2 would likely have more short-term disturbances to recreation (from smoke and limited access), the long term effects to recreation would be improved viewsheds and opportunities to recreate in a healthy forest with reduced risk of wildfire.

### Heritage

Relatively speaking, alternative 2 may pose a higher cumulative risk to heritage values over time than alternative 3 as it proposes twice the number of mechanical treatments, and will most likely be implemented further into the future than Alternative 3. However, overall, the cumulative effects on heritage resources as a result of Alternative 2 is not considered to be adverse due to compliance with Section 106 of the National Historic Preservation Act, the 2004 Programmatic Agreement, design criteria, and mitigation and development of site protection implementation plans.

### Tribal

See hydrology, wildlife, botany and fisheries sections for complete cumulative effects analysis relative to these treaty resources.

### Inventoried Roadless Areas

Past salvage harvest occurred in Wildhorse and Cook Ridge IRAs following high severity wildfire (Teepee Butte) in 1988. Past harvest and salvage also occurred in the Joseph Canyon IRA in the late 1980's much of this was helicopter logged and largely maintained the IRA in an unroaded state. The Teepee Butte and Joseph Canyon Fire had uncharacteristically severe effects in much of the fire footprint within the IRAs. This led to the continued difficulty for natural regeneration of conifer species due to competition of non-forest vegetation, availability of seed source, and increased harshness of the site following the fires. Planting occurred in the early 1990's in the Cook Ridge and Wildhorse IRAs. While salvage harvest reduced the rate of large woody fuel recruitment post stand replacement fire, the type of green tree harvest that occurred generally removed the large, old, and early seral trees from the sale units. This situation along with ongoing fire suppression led to an increase in departure from reference density, structure, composition, pattern, and natural disturbance regimes. It is reasonable to assume that fire suppression would occasionally occur in the IRAs and grazing would continue. Past actions in general have added to the departure from reference conditions that this action is aimed at restoring to create forest resiliency and maintain and restore characteristics of ecosystem structure and roadless area characteristics. The combination of past projects with implementation of Alternative in the LJCRP, plus continued fire suppression and grazing,

constitutes a minor cumulative effect to vegetation in the IRAs. Past activities and ongoing fire suppression and grazing continue to add to the departure in density, composition, structure and characteristic disturbance regimes, while the actions proposed under this project are designed to restore that departure and disturbance. The overall effect would be beneficial as the LJCRP would provide additional decision space to make more ecologically informed fire management decisions, increase acceptance in the use of characteristic fire and help maintain ecosystem composition and structure as described in RACR.

### Potential Wilderness Areas

Since the boundaries of PWAs were delineated based on current system roads and past timber harvest activity there are no past actions that affect these areas. Currently there are no additional present or reasonably foreseeable actions that would remove any portion of these areas from consideration as potential wilderness. Therefore, there are no cumulative effects associated with PWAs.

### Other Undeveloped Land

The LJCRP boundary provides the geographic extent for the analysis of cumulative effects to other undeveloped land. This boundary is appropriate because it can reasonably be expected that the direct/indirect effects resulting from LJCRP are not expected to interact with any similar effects that might occur elsewhere. The temporal boundary for this cumulative effects analysis is 10 years. The effects to the intrinsic values of these lands would be limited to activities occurring for the LJCRP.

For other undeveloped land in which the project activities would occur, cumulative effects to the physical (climate, soil, minerals, water quality, air quality) biological (vegetation, disturbance, wildlife, fisheries, botany), and social environments (heritage, recreation, scenery, transportation) are disclosed in other sections and will not be reiterated here. Cumulative effects for other undeveloped land within IRA are described in that section. Cumulative effects for other undeveloped lands outside the IRA would be similar to those disclosed in the IRA section of this document.

Cattle grazing, dispersed camping, and road use would present a minor cumulative impact to apparent naturalness, solitude, and remoteness. Overall cumulative impacts to characteristics associated with other undeveloped lands would be minor in proportion to the anticipated direct and indirect effects.

### Areas identified as Unroaded by Environmental Organizations (UEO)

Because UEO areas contain similar intrinsic social values as IRA, PWA, or Other Undeveloped Land the cumulative effect to UEO would not differ from previously disclosed effects for those sections.

## Cumulative Effects – Present and Foreseeable Vegetation Management Activities

There are no vegetation management, fuels treatment and prescribed burning activities that are ongoing (as of 2014) or are foreseeable within the project area.

## Alternative 3: Direct and Indirect Effects

### The physical environment

#### Climate

Relative comparisons of the degree of climate change adaptation between alternatives are based on evaluation of one or more of the following indicators:

- Acres available for planting (even-aged harvest) and providing opportunities to adapt tree species composition to changing climates
- Acres of designated wildlife corridors, which can reduce barriers to movement
- Acres of thinning to restore disturbance regimes and/or reduce uncharacteristically severe wildland fires
- Miles of roads with improved drainage and reduced sediment delivery, thus reducing hydrologic connectivity of the road system
- Miles of riparian restoration, which restores floodplain connectivity, flow regimes, and/or increases effective stream shade
- Acres of invasive plants treated

Treatments in alternative 3 would move the project area closer to the reference condition in vegetation and disturbance regime, creating a more resilient and sustainable condition in the face of climate change when compared to the No Action, but to a lesser degree than alternative 2.

#### Soils

See detailed descriptions of effects under Alternative 2: Direct and Indirect Effects

#### *Surface Erosion*

The potential for surface erosion as a direct result of the proposed management activities in alternative 3 will be lower than in alternative 2 because there will be fewer stands treated and therefore less disturbance. Additionally, fewer roads would be decommissioned under alternative 3 so there would be a lower potential for surface erosion from this disturbance. However, indirectly, there is greater potential for long term surface erosion and sediment production under Alternative 3 because fewer are being conditions and the proposed treatments will be less effective at moving the landscape toward a more resilient condition. Alternative 2 and 3 have the same proposed temporary road system (12.6 miles).

Road traffic will likely increase under alternative 3 but would not be measurably different from alternative 2.

#### *Sediment from log haul*

See "Effects common to all action alternatives".

#### *Mass Wasting*

See "Effects common to all action alternatives".

### *Soil Productivity*

In alternative 3 there would be ground based harvest and 12.6 miles of temporary road construction that may directly contribute to DSCs at the management unit scale as a result of the proposed management activities. Alternative 2 and 3 have the same proposed temporary road system.

See detailed descriptions of indirect effects under Alternative 2: Direct and Indirect Effects.

### *Air quality*

See “Effects common to all action alternatives”.

## **The biological environment**

### **Vegetation and disturbance regimes**

Table 90 lists the cutting treatments proposed under alternative 3, approximate acres for each treatment and the percent of the total treatment acres each treatment type represents. A total of 12,778 acres of cutting treatments are proposed. Moderate and high intensity single tree selection treatment types account for 62 percent of the treatment acres and stand improvement (non-sawlog) treatments add another 20 percent. Under this alternative, approximately 23 percent of the forested acres within the project area would have a cutting treatment.

Compared to the modified proposed action (alternative 2), alternative 3 proposes 2,840 less acres of stand improvement, 6,045 less acres of STS/GS/IT treatments, 273 less acres of Savanna treatments, and 0 acres of meadow restoration.

**Table 90. Alternative 3 – Acres by cutting treatment type in the Lower Joseph Creek Restoration Project area**

<b>Cutting Treatment Type</b>	<b>Approximate Acres (Change from Alt. 2)</b>	<b>Percent of Treatment Acres (Percent of Forested Acres)</b>
Stand Improvement – Stands Dominated by Seedlings and Saplings	1,024 (-2538)	8%
Stand Improvement – Stands Dominated by Poles	1,589 (-302)	12%
Single Tree Selection – High Intensity	3,757 (-1369)	29%
Single Tree Selection – Moderate Intensity	4,251 (-1568)	33%
Single Tree Selection – Low Intensity	804 (-471)	6%
Single Tree Selection in MA15 – Moderate Intensity	0 (-763)	0%
Single Tree Selection in MA15 – Low Intensity	0 (-30)	0%
Group Selection – High Intensity	397 (-1545)	3%
Group Selection – Moderate Intensity	451 (-145)	4%
Group Selection – Low Intensity	31 (-7)	<1%
Intermediate Treatment – High Intensity	70 (-54)	1%
Intermediate Treatment – Mod Intensity	36 (-87)	<1%
Intermediate Treatment – Low Intensity	83 (-6)	1%
Savanna*	285 (-273)	2%
Meadow Restoration* (Swamp Creek)	0 (-31)	0%

Cutting Treatment Type	Approximate Acres (Change from Alt. 2)	Percent of Treatment Acres (Percent of Forested Acres)
<b>Cutting Treatment Total (Forested Acres)</b>	<b>12,778 (12493)</b>	<b>100% (23%)</b>
<b>Forested Acres – No Cutting Treatment</b>	<b>42,872</b>	<b>(77%)</b>
<b>Total Forested Acres</b>	<b>55,365</b>	<b>(100%)</b>

\*Savanna and meadow restoration treatments are in areas that do not meet the definition of forested.

### Forest Cover Type

Cover type percent by potential vegetation group and percent change from existing due to alternative 3 treatments are listed in Table 91. The prevalent effect in terms of movement toward RV would be in the ponderosa pine cover type. There would be a seven percent increase in the dry PVG and another one percent increase in the moist PVG. There would also be notable changes to the Douglas-fir cover type with a six percent reduction in the dry PVG and a one percent reduction in the moist PVG. Overall, alternative 3 would move all cover types in both PVGs closer to RV with the exception of lodgepole pine in the moist PVG.

**Table 91. Alternative 3 – Post treatment distribution of forest cover types in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Cover Type	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Dry upland forest (UF)	Ponderosa pine	14,640	35% (+7)	50-80
	Douglas-fir	19,179	45% (-6)	5-20
	Western larch	607	1% (+<1)	1-10
	Lodgepole pine	197	<1% (-<1)	0
	Grand fir	7,347	17% (-1)	1-10
	Engelmann spruce	0	0%	0
	Unknown	438	1%	
Dry UF Total		42,407	100%	
Moist upland forest (UF)	Ponderosa pine	1,580	12% (+1)	5-15
	Douglas-fir	5,713	44% (-1)	15-30
	Western larch	729	6% (+2)	10-30
	Lodgepole pine	177	1% (-<1)	25-45
	Grand fir	4,606	36% (-<1)	15-30
	Engelmann spruce	89	1% (-<1)	1-10
	Unknown	64	<1%	

Potential Vegetation Group	Cover Type	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Moist UF Total		12,958	100%	
Grand Total		55,365		

### *Forest Structural Stages*

Table 92 summarizes the forest structural stage percent by potential vegetation group and percent change from existing due to alternative 3 treatments. Highest movement toward RV would be in the OFSS structural stage with a five percent increase in the dry PVG and two percent increase in moist. The SE stage would experience movement away from RV in both PVGs. Overall, alternative 3 would result in a similar pattern in relation to RV as compared to alternative 2 at slightly lesser amount due to less acres treated.

**Table 92. Alternative 3 – Post treatment distribution of forest structural stages in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Structural Stage	Acres		Percentage of Potential Vegetation Group (Percent Change from Existing)		Percentage of Potential Vegetation Group (Percent Change from Existing)
Dry UF	OFSS	1,952		5% (+5)		5% (+5)
	OFMS	8,283		20% (-<1)		20% (-<1)
	YFMS	2,969	7% (-1) 38% (+1)	7% (-1)	45% (0)	5-10
	UR	16,192		38% (+1)		
	SE	3,696		13% (-5)		13% (-5)
	SI	7,131		17% (+<1)		17% (+<1)
	Unknown	184		<1%		<1%
Dry UF Total		42,407		100%		100%
Moist UF	OFSS	209		2% (+2)		2% (+2)
	OFMS	4,188		32% (+2)		32% (+2)
	YFMS	1,838	14% (-1) 21% (+1)	14% (-1)	35% (-1)	10-20
	UR	2,743		21% (+1)		
	SE	1,883		15% (-3)		15% (-3)
	SI	2,074		16% (+<1)		16% (+<1)
	Unknown	23		<1%		
Moist UF Total		12,958		100%		
Grand Total		55,365				

### Tree Density Class

Table 93 displays the density class percent by potential vegetation group and percent change from existing due to alternative 3 treatments. Overall, alternative 3 would move or maintain all density classes within RV for both PVGs with the exception of dry high, which would remain outside RV.

**Table 93. Alternative 3 – Post treatment distribution of tree density classes in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Tree Density Class	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)	Range of variation (%) (Powell 2010)
Dry UF	Dry High	10,115	24% (-9)	5-15
	Dry Mod	10,168	24% (-8)	15-30
	Dry Low	21,918	52% (+18)	40-85
	Unknown	206	<1%	
Dry UF Total		42,407	100%	
Moist UF	Moist High	3,785	29% (-16)	15-30
	Moist Mod	4,774	37% (+9)	25-60
	Moist Low	4,198	32% (+7)	20-40
	Unknown	201	2%	
Moist UF Total		12,958	100%	
Grand Total		55,365		

### Pattern

Alternative 3 would treat 12,493 acres using the Individuals, Clumps and Openings (ICO) approach to restoring forest spatial pattern.

### Size Class Distribution

Similar to alternative 2, thinning treatments would result in an immediate increase in average tree diameter by favoring dominant and codominant trees. The treatments would also increase average tree diameter in the short term by reducing intertree competition and improving individual tree growth.

Table 94 displays the estimated post treatment size class distribution and the percent change from the existing distribution. For both the dry and moist PVGs, tree size class would be trending toward larger tree size classes with a five and six percent increase respectively in the >20 size class.

**Table 94. Alternative 3 - Tree size class distribution in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Tree Size Class (diameter range in inches)	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)
Dry upland forest (UF)	<5	6,616	16% (-1)
	5-10	1,325	3% (+1)

Potential Vegetation Group	Tree Size Class (diameter range in inches)	Acres	Percentage of Potential Vegetation Group (Percent Change from Existing)
	10-15	13,098	31% (-7)
	15-20	12,313	29% (-1)
	>20	8,871	21% (+5)
	Unknown	184	<1%
Dry UF Total		42,407	100%
Moist upland forest (UF)	<5	1,965	15% (-1)
	5-10	892	7% (+1)
	10-15	2,913	22% (-5)
	15-20	3,508	26% (+2)
	>20	3,716	29% (+6)
	Unknown	64	<1%
Moist UF Total		12,958	100%
Grand Total		55,365	

### *Disturbance and Fire Regime*

The effects of harvest, SI, and prescribed fire are described in “Effects common to all action alternatives”, above. The action alternatives vary in effect based solely on intensity of treatment represented by the number of acres. Alternative 3 includes less acres of harvest and SI thereby improving forest structure, density, and composition and associated fire regime characteristics to a lesser degree than under Alternative 2.

### **Prescribed fire (planned and unplanned)**

Alternative 3 has less area identified as a high priority for prescribed fire (46,480 acres) than Alternative 2 (48,577 acres), primarily due to the relatively lower forest area treated mechanically, and thus needing activity fuels treatment. Alternative 3 has similar beneficial impact on fire regime departure and landscape resiliency by burning approximately 4 to 6 percent of the landscape per year compared to Alternative 2 (modeled results, see Appendix C). Where Alternative 3 departs from Alternative 2 in that benefit occurs during high fire years where approximately 15–25 percent is predicted to burn. This is outside the reference fire regime and expected natural burn pattern insofar as the area moving toward fire as a natural disturbance process. During high fire years, even with treating approximately 4 to 6 percent/year with prescribed fire, Alternative 3 further departs from reference and desired landscape conditions and is relatively similar to conditions under the no action alternative.

### **Activity Fuels**

There would be less activity fuels created with the implementation of Alternative 3 as compared to Alternative 2. The treatment of activity fuels in “Effects common to all action alternatives” remains the same. Disposition of activity fuels is a key part in ensuring that fire severity does not increase due to the additional accumulation of fuels as a result of silvicultural activity. There is no increased impact to fire risk under Alternative 3 when compared to Alternative 2.

### Fire Management Decision Space

Alternative 3 creates limited decision space to manage wildland fire (planned and unplanned ignitions). State-and-transition simulation modeling (Appendix C) indicates that during a high fire year in the LJCRP area the amount of the landscape that burns is departed (greater) than the expected fire regime extent (6-15%/year). Although there is no difference between expected acres intentionally burned with planned and unplanned ignitions, (4 – 6%) depending on the year, there is limited benefit to managing unplanned ignitions under Alternative 3 due to not actively managing IRA, PWA, Designated Old Growth, and RHCAs. This creates an environment similar to the no action in terms of ecological and social risk of having unwanted fire effects such as uncharacteristically severe fire or fire affecting a large portion of the area (particularly within or adjacent to IRA, PWA, Designated Old Growth, and RHCAs) in a given year such as to impact the character of forest succession and fire regime. Alternative 3 has limited effect to areas around and within IRA, PWA, Designated Old Growth, and RHCAs on the ability of wildland fire to become a restorative process at an ecologically appropriate scale and severity without active management in those areas.

### Insects and Disease Susceptibility

Table 95 lists the estimated, alternative 3 post treatment susceptibility ratings for the six insect and disease agents associated with the PVGs and cover types within the LJCRP area. The ratings and trends are similar to alternative 2 with the following exceptions.

#### Dry and Moist PVG

- Douglas fir mistletoe would be outside RV for the low and high ratings and within RV for the moderate rating. The low is the same as existing with the moderate rating higher than existing and the high rating lower than existing.

**Table 95. Alternative 3 – Post treatment insect and disease susceptibility in the Lower Joseph Creek Restoration Project area**

Potential Vegetation Group	Agent	Susceptibility Rating - % of Forested Area					
		Low		Moderate		High	
		Post Trt.	RV Range	Post Trt.	RV Range	Post Trt.	RV Range
Dry upland forest (UF)	Defoliators	29%+	40-85%	40%+	15-30%	31%-	5-15%
	Douglas-fir Beetle	15%=	35-75%	50%+	15-30%	35%-	10-25%
	Fir Engraver	40%=	45-90%	45%=	10-25%	14%=	5-10%
	Bark Beetles in P Pine	22%-	5-10%	58%+	15-30%	19%-	40-90%
	Douglas-fir Dwarf Mistletoe	14%=	25-55%	40%+	15-40%	46%-	20-35%
	Root Diseases	31%=	30-60%	51%+	25-50%	18%-	5-25%
Moist upland forest (UF)	Defoliators	9%+	5-10%	28%-	20-30%	62%-	35-90%
	Douglas-fir Beetle	5%=	30-60%	27%+	20-40%	67%-	10-30%
	Fir Engraver	20%+	30-70%	35%+	20-35%	45%-	10-20%
	Bark Beetles in P Pine	30%-	40-70%	61%+	15-35%	10%-	5-25%

Potential Vegetation Group	Agent	Susceptibility Rating - % of Forested Area					
		Low		Moderate		High	
		Post Trt.	RV Range	Post Trt.	RV Range	Post Trt.	RV Range
	Douglas-fir Dwarf Mistletoe	11%=	30-65%	34%+	20-45%	55%-	10-20%
	Root Diseases	17%+	5-15%	55%+	20-50%	27%-	35-75%

+ increase from current; - decrease from current; = same as current.

Dwarf Mistletoe and the Degree of Mistletoe Infestation - Design criteria are the same as for alternative 2, but alternative 3 would result in a reduced mistletoe infection on fewer acres of cutting treatment (12,493 acres versus 21,378 acres for alternative 2). This includes 189 acres of cutting treatment in moderate to heavily mistletoe infected stands (versus 336 acres under alternative 2).

#### *Timber Resource*

There would be approximately 10,200 acres of harvest treatment (acres treated that remove timber volume) and there would be approximately 6,600,000 cubic feet of timber volume removed as a result of restoration treatments. This would be a direct beneficial effect of alternative 3, but lower than alternative 2.

#### *Rangelands, understory vegetation, and TES plant species*

See Effects common to all action alternatives. Tables comparing variations in noxious weed infestations can be found under the Alternative 2 Effects sections for "Range and understory Vegetation". Alternative 3 has slightly less impact on Snake River daisy, Davis fleabane and Wallowa ricegrass because there would be no treatments in IRAs or MA15s in Alternative 3.

#### *Aquatic habitat*

Although difficult to quantify, the effects to aquatic habitat from fine sediment may be less than those described in Alternative 2 because of the exclusion of tree removal in the RHCAs under Alternative 3. However, modeling indicates a negligible difference in sediment delivery to streams between the action alternatives when Best Management Practices and Project Design Features are implemented. In addition there would be no commercial harvest in Category 4 RHCAs. Thus the overall short-term increase in erosion rates in the analysis area is likely to be smaller compared to Alternative 2 (see the Physical Environment supporting documentation).

For Alternative 3, commercial thinning activities would not occur in RHCAs adjacent to Category 1 (fish bearing) and Category 2 (nonfish-bearing perennial) streams or Category 4 (intermittent). Restricting these activities to areas outside of RHCAs of Category 1 and 2 streams would prevent adverse impacts to existing stream shading along streams in the analysis area. The RHCA widths adjacent to Category 1 streams (300 ft on either side) and Category 2 streams (200 ft on either side) are sufficient to prevent removal of trees that provide stream shading. Therefore, measurable increases in stream temperatures would not result from proposed thinning activities.

Burning activities under Alternative 3 would be reduced compared to Alternative 2 based on acres treated. With a reduction in activity fuels treatments the possibility of impacting large shade producing trees would be reduced thereby reducing the effects of the alternative on water temperature.

*Federally listed species – fish*

Alternative 3 of the LJCRP may affect Snake River steelhead or its designated critical habitat and is not likely to adversely affect the species and its designated critical habitat. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment (see effects to aquatic habitat section). This short term increase in fine sediment relative to the existing fine sediment levels would be immeasurable and be a result of the reduction in acres treated, RHCAs treated, reduced road.

*Management indicator species – fish*

Alternative 3 of the LJCRP may impact individual redband trout and their habitat (MIIH), but will not likely contribute toward federal listing or loss of viability to the population or species. Impacts to redband trout may occur as a result of short-term immeasurable increases in fine sediment and water temperature (see effects to aquatic habitat section).

Alternative 3 of the LJCRP may impact individual Snake River steelhead and their habitat (MIIH), but will not likely contribute toward loss of viability to the population or species. Impacts to Snake River steelhead may occur as a result of short-term immeasurable increases in fine sediment and water temperature (see effects to aquatic habitat section).

Current levels of fine sediment in the majority of streams in the analysis area are below the 20% threshold used to indicate adverse impacts to salmonids. In these areas short-term potential increases in fine sediment from proposed prescribed burning and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Impacts from activities proposed under Alternative 3 are unlikely to result in degradation of habitat for Snake River steelhead and redband trout. Anticipated immeasurable increases in both fine sediment and water temperature are within habitat tolerances for steelhead and redband trout.

Cumulatively, aquatic habitat should improve over time in the analysis area. Fine sediment levels should decrease through time as a result of improved road closures and decommissioning activities. Alternative 3 will likely not result in a short-term slowing of recovery of aquatic habitat in the analysis area.

In the long-term, alternative 3 would improve vegetative conditions and maintain the natural fire regime in the project area which will have beneficial impacts to Snake River steelhead and redband trout and their habitat

Alternative 3 of the LJCRP may impact individual western ridge mussels and their habitat (MIIH), but will not likely contribute toward federal listing or loss of viability to the population or species. Impacts to western ridge mussels may occur as a result of short-term immeasurable increases in fine sediment and water temperature (see effects to aquatic habitat section).

Current levels of fine sediment in the majority of streams in the analysis area are below the 20% threshold used to indicate adverse impacts to salmonids and likely the western ridge mussel. In these areas short-term potential increases in fine sediment from proposed prescribed burning and thinning activities are unlikely to result in measurable increases in fine sediment in streams in the analysis area.

Impacts from activities proposed under Alternative 3 are unlikely to result in degradation of habitat for western ridge mussels. Anticipated immeasurable increases in both fine sediment and water temperature are within habitat tolerances for western ridge mussels.

Cumulatively, aquatic habitat should improve over time in the analysis area. Fine sediment levels should decrease through time as a result of improved road closures and decommissioning activities. Alternative 3 would likely not result in a short-term slowing of recovery of aquatic habitat in the analysis area.

In the long-term, alternative 3 would improve vegetative conditions and maintain the natural fire regime in the project area which will have beneficial impacts to western ridge mussels and their habitat.

## Wildlife

### *Primary cavity excavators*

It is expected that population decreases in MIS for dead and defective wood habitat would be expected to occur. While additive cumulative effects may be anticipated, projects are consistent with forest plan objectives.

The vegetation treatments proposed will negatively impact current and future dead and defective wood habitat. Harvest treatment is proposed on about 23% (12,800 acres) of the forested landscape. It can be assumed that within treatment areas there would be a reduction in snags and logs due to skid trails, landings, safety reasons and prescribed burning. Proposed activities (tree harvest and prescribed burning) are expected to help create habitat for PCEs using open forests (e.g. white-headed woodpeckers) and reduce habitat for those PCEs using dense forests (e.g. pileated woodpeckers).

The closure of roads would positively affect the abundance of snag and down wood habitat. However, this alternative maintains the most open miles of roads, which would be open to the public. Thus, there would be the greatest potential for continued loss of snags across the landscape due to safety and firewood harvesters.

### *Pileated woodpecker*

Table 65 compares conditions of pileated woodpecker source habitat by alternative. Alternative 3 would maintain source habitat within HRV, but due to commercial harvest, would have lower habitat quality and quantity compared to alternative 1. Alternative 3 also results in less area in source habitat than Alternative 2. The non-harvested area that meets the qualifications of source habitat for pileated woodpeckers is approximately the same in both alternatives (10-11%), which is within the HRV for this species. Alternative 3 does not allow for cutting of trees >21", and hence, would have a less of a direct negative effect than alternative 2 on pileated woodpeckers and other cavity nesting and large tree dependent wildlife species by maintaining higher quality habitat on areas treated.

Though some current source habitat will be harvested, and the quality of the habitat may be reduced, overall source habitat will remain within the RV for this species in this project area. Therefore, alternative 3 would not contribute to a negative trend in viability on the WWNF for the pileated woodpecker.

### *Northern goshawk*

Through harvest, the abundance of source habitat for goshawks is reduced by 2,845 acres. The amount of source habitat remains within the HRV (1-46%). Although the overall area harvested in alternative 3 is less than in alternative 2, the resulting amount of source habitat for goshawks appears to be lower. In alternative 2 more acres of vegetation that is currently in the size class of medium (10-15"), moves to the next size class (15-20" dbh) post-harvest (the mean diameter of remaining trees increases), while also maintaining >40% canopy closure. As described in alternative 2, although these stands meet the definition of source habitat, it is likely the quality of the habitat is reduced.

Within the area that is defined by tree size and canopy closure as source habitat, after implementation of alternative 3 about 2,681 acres would be treated by commercial harvest but still meet the definition of source habitat. In alternative 3, no trees  $\geq 21$ " dbh may be harvested which would provide for higher quality habitat within the treated areas, as large trees are an important habitat component for goshawks. Source habitat that has been harvested would likely be of lower quality due to the loss of canopy closure, and loss of large snags and logs due to safety and logging systems.

Although trees with mistletoe are likely to be removed in all harvest units, especially in the 'Intermediate Treatment' prescriptions (38 acres), the loss of mistletoe may also reduce the quality of source habitat. The removal of trees with dwarf mistletoe brooms may be detrimental to northern goshawk and other species that nest in mistletoe brooms (Bull and others 1997).

The closure of an additional 3 miles of road above existing decisions (alternative 1) should benefit northern goshawks, as human disturbance has been documented to negatively affect this species.

### *American marten*

Under alternative 3, proposed commercial harvest in moist forests would be 2,705 acres, of which 742 acres is within what currently qualifies as marten source habitat (moist – large tree – closed canopy). These 742 acres represents about 34% of the current source habitat for marten in the project area. The prescription on these 742 acres is a combination of GS\_Mod (108 acres), STS\_High (122 acres), and STS\_Mod (512 acres). The design criteria for these prescriptions is to maintain >60% canopy closure, and multi-story conditions; no trees  $\geq 21$ " would be harvested. It is assumed that post-harvest these stands would be maintained as source habitat. It is likely that in the short-term they may meet minimum qualifications as source habitat but the quality of the habitat may be reduced due to reduced complexity and tree density, and potential loss of snags and logs due to logging operations and safety.

As discussed in the PCE section above, densities of large snags (>20 inches dbh) in moist forest are below reference conditions in the snag density classes that provide habitat for American marten (Figure 2). Snag habitat is likely to be a limiting factor for marten in these habitat types. Harvesting on 2,705 acres would add to a reduction in snag habitat, further declining habitat quality for marten in this area. However, in alternative 3 there would be no removal of trees  $\geq 21$ " dbh which should be beneficial in long-term recruitment of snag habitat, as these trees would be available as potential snags and down wood.

In alternative 3, 108 acres of the marten habitat that is being commercially harvested is in the prescription 'GS\_Mod' (group selection – moderate). Group selections can include openings that are 1/2-4 acres. As described above, martens respond negatively to low levels of habitat

fragmentation (Hargis et al. 1999). Openings as large as 4 acres may reduce the quality of the habitat for marten. In the longer-term, as trees continue to grow, American marten would continue to use these harvested areas for some or all of their life history functions. Vegetation treatments in both action alternatives are assumed to modify fire behavior and reduce the effects of an uncharacteristic stand replacement event, thereby potentially retaining source habitat in the long-term.

Open roads can contribute to a loss of quality of habitat through loss of snags and downwood due to firewood harvest and safety, and can reduce habitat quality (Godbout and Ouellet 2008).

### *Rocky Mountain elk*

Table 46 summarizes forest plan standards for road density by management area, and alternative. Similar to alternative 2 the forest plan standards for HEI and percent cover in MA1 areas would be met. The HEI standard of  $\geq 0.5$  on MA1 is met in both the Lower and Upper Joseph watersheds. The percent cover on the summer ranges remains above 30%. The reduced cover may increase forage quantity and quality especially in the spring. However, this reduced cover may decrease hiding cover ( $\geq 40\%$  canopy closure), particularly in the Upper Joseph watershed and the entire winter range habitat. The reduced harvest in alternative 3 provides for more cover across the planning area than in alternative 2.

Alternative 3 changes about 7,000 acres of cover to forage across the entire planning area (about 40% fewer acres than alternative 2). Both harvest treatments and prescribed burning may also contribute an increase in forage quantity and quality, especially in the spring.

Alternative 3 proposes higher miles of open road than in alternative 2. The project would temporarily increase open roads by about 12.6 miles. Post-project road densities in 6 out 10 subwatersheds remain above Forest standards, and there is little change from the existing condition. Excessive open roads have negative effects on habitat effectiveness by taking land out of production, reducing the effectiveness of cover, and increasing disturbance to elk. Additionally of concern within the analysis area is the unregulated OHV and full-sized vehicle use of closed roads which has been shown to negatively affect elk and elk habitat. Together with the loss of cover and higher road densities particularly in the Davis, Lower Swamp Creek subwatersheds, elk distribution and habitat effectiveness may be negatively affected.

To reduce disturbance to big game on winter ranges timber sale activities, including log haul, would minimize activities during periods of low temperatures and accumulated snow depths, typically from December 15 through March 31st.

### *Old growth management areas, late-old forest habitat, and connectivity corridors*

Forest treatments in MA15 areas in alternative 2 aim to restore dry forest old growth characteristics, which would not occur under alternative 3. While current old forest conditions would be conserved into the long term, there would be a higher risk of loss due to uncharacteristic fire under alternative 3 than alternative 2, particularly in dry forest.

Table 96 summarizes commercial forest vegetation treatments within LOS and MA15 connectivity corridors for alternative 3. Alternative 3 would reduce the quality of connectivity corridors on 2,118 acres by reducing the canopy closure and structural complexity. The prescriptions in the proposed treatment units within the connectivity corridors have been designed to provide canopy closure at  $\geq 40\%$  in the dry forest PVG, and  $\geq 50\%$  in the moist forest PVG. Although canopy closure and structural complexity may be reduced, these stands

are expected to maintain the function and objectives of connectivity as described in the Eastside Screens. This level of tree stocking would reduce competition between residual trees, increase tree growth rates, and increase trees' ability to defend against insects and diseases, while retaining levels of canopy closure and structural complexity to facilitate movement of wildlife between LOS habitat patches.

**Table 96. Acres commercially harvested within connectivity corridors by alternative for the LJCRP.**

	Acres of Connectivity	Alt 1 Commercial Harvest (% of total Connectivity)	Alt 2 Commercial Harvest (% of total Connectivity)	Alt 3 Commercial Harvest (% of total Connectivity)
Total	12,326	0	4,155 (34%)	2,118 (17%)
Dry Forest PVG	9,829	0	3,522 (36%)	1,736 (18%)
Moist Forest PVG	2,497	0	633 (25%)	382 (15%)

Alternative 3 would allow for prescribed fire across much of the planning area, and 413 acres of treatment in seedling/sapling and pole stands within connectivity corridors. Some snags and logs may be consumed by prescribed fire, while new snags and logs are recruited from fire-killed trees. The burning, and small tree thinning in connective corridors will not have a measurable negative effect on the quality or function of the corridors.

#### *Landbird and migratory bird habitat*

Effects from this project to migratory birds would be variable depending on the the species (Table 67). Alternative 3 would harvest fewer acres than alternative 2. Therefore, canopy cover and snags would be reduced on fewer acres than alternative 2. Additionally, riparian areas would not be directly altered, nor would trees  $\geq 21''$  be removed.

Higher road densities in alternative 3 compared to alternative 2 would likely be more adverse for all of these migratory birds. Road-associated factors that negatively affect some species of migratory and resident birds include: snag and log reduction, habitat loss and fragmentation, negative edge effects, harassment or disturbance, collisions, displacement or avoidance, and chronic negative interactions with humans (Penninger 2009). Also See "effects common to all action alternatives"

## **The social environment**

### **Socioeconomics**

Under Alternative 3, there would be no treatments in MA15, IRAs, and PWAs. Small diameter thinning could occur in category 1, 2 and 4 RHCAs as per Blue Mountains Project Design Criteria. No trees greater than 21 inches would be harvested, except for safety or administrative reasons. In IRAs, there would also be no non-commercial treatments. Activities under this alternative, such as timber harvest and restoration, would have the economic consequences described below.

### *Financial efficiency*

Table 97 summarizes the financial efficiency for Alternative 3. The PNV indicates the financial efficiency of the timber sale and restoration activities, including all costs (that are not included in the stumpage rate) and revenues associated with the activities and required design criteria (information obtained from Timber specialist assigned to the project). Restoration activities examined under this alternative include (among others) resiliency treatments, prescribed fire, and planting. A 4 percent discount rate was used over a period of 10 years (2014–2023), the estimated time required for full implementation of the project.

Table 97 indicates that alternative 3 is not financially efficient for the timber harvest and required design criteria, as well as for all restoration activities noted above, as indicated by the negative PNV, -\$5.1 million. However, since the PNV does not include non-market values, such as ecosystem services as discussed above, the benefits are likely underestimated. The estimated costs of treatment under alternative 3 are less than alternative 2 since the restoration treatments are less intensive. Therefore, the expected non-market values derived from alternative 3 will likely be less than alternative 2 and greater than alternative 1.

Indirect effects on financial efficiency could occur as a result of alternative 3, however, estimates of these changes are not available. It is anticipated that fuels treatments under this alternative would contribute to fuels conditions that would have more resistance to wildland fire. This would tend to decrease wildland fire related costs such as property loss, lost revenues and suppression costs.

**Table 97. Present Net Value for alternative 3.**

<b>Alternative 3</b>	<b>Present Value of Benefits</b>	<b>Present Value of Costs</b>
<b>BENEFITS</b>		
Revenue from commercial timber volume	\$1,231,234	
<b>COSTS</b>		
Non-Mechanical		\$4,168,676
Mechanical		\$852,394
Commercial timber harvest		\$1,369,119
Sum of discounted benefits and costs	\$1,231,234	\$6,390,190
Present Net Value	\$(5,158,956)	

### *Economic Impacts*

Alternative 3 would result in restoration activities with commercial timber production of 6,600 ccf per year for 10 years; mechanical, pre-commercial stand treatment on 584 acres per year; 142 acres of restoration treatment by hand labor; and some temporary road construction and road maintenance. Implementation of alternative 3 is projected to support 34 jobs (Table 98) and \$1.9 million in labor income in Wallowa and Union counties annually over 10 years. Those impacts in the local area include the jobs supported directly by completion of restoration treatments and processing of the commercial timber and the indirect and induced jobs related to those activities. The economic effect resulting from restoration activities would be less under Alternative 3 than under alternative 2. The implementation of alternative 3 would also yield employment changes in many economic sectors within Wallowa and Union counties. The greatest number of jobs

supported would accrue to the Manufacturing and Agriculture and Forestry sectors. Other sectors affected by the LJCRP include Retail Trade, Construction, Professional Services, and Health Care.

**Table 98. Projected employment by major industry for alternative 3**

<b>Industrial sector</b>	<b>Jobs supported</b>
Manufacturing	12
Agriculture and forestry	11
Professional, scientific, and technical services	2
Retail trade	2
Health care and social assistance	1
Accommodations and food services	1
Construction	1
Other industrial sectors (8)	4
<b>Total</b>	<b>34</b>

### *Social Impacts*

In addition to effects on the local economy, activities under alternative 3 have the potential to affect the livelihood, cultural values, and biological values of people in the analysis area. The social consequences are measured qualitatively, with a particular focus on access, recreation uses, environmental justice and non-market values.

### **Livelihood**

The jobs and income, as detailed above under the economic impacts section, that alternative 3 are expected to generate would likely improve the livelihood of area residents more than alternative 1 but less than alternative 2. These jobs and income are expected to be generated over the next ten years, the life of the project. The increase in jobs and labor income in the analysis area from alternative 3 would likely increase the tax base, public services, funding for schools, capital maintenance projects, and reduce poverty. Since the increase in jobs and income is less under alternative 3 than alternative 2, the expected increase in the public services would be less than under alternative 2.

The tax rates on timber harvested during 2014 under the Forest Products Harvest Tax (FPHT) is \$3.53 per thousand board feet (MBF). The receipts from this tax program are dedicated to the partial funding of state-run programs that promote forest research, fire prevention and fire suppression, forest practices act administration, and improve public understanding of Oregon's forest resources (State of Oregon 2014). However, the funding for schools and other public services are more likely to come from personal income taxes (from 5 to 9.9 percent of taxable income) and property taxes. With increases in labor income, as detailed in the economic impacts section above, the state tax base and therefore public services could also increase.

Additionally, with more jobs and income in the area under alternative 3 relative to alternative 1, there likely would be more opportunities for younger generations. In turn, youth may choose to stay in the area and improve the age diversity. With a more balanced age composition, the economy would be more sustainable in the long-term.

Alternative 3 would not close or decommission any roads over the 10-year span of the project and would therefore have no impact on access to WWNF public lands compared to the other alternatives. Many community members value access to public lands, but alternative 3 would not affect this value. Public access could be impacted by short-term increases in traffic but these effects would be intermittent during restoration. The potential increase in traffic is based on treatments in association with the timber sale. Under alternative 3, there are less treated acres than alternative 2, and therefore less short-term effects to traffic.

### **Cultural Values**

As discussed in the Affected Environment section above, residents in the LJCRP area value the land mostly for recreation uses, such as hunting, fishing, gathering forest products, wildlife viewing and scenery, among others. See the Tribal report for effects to subsistence uses. These recreation uses are also linked to access, as discussed in the previous section. With more roads decommissioned, this limits access to public lands for recreation purposes. Since alternative 3 has no new decommissioned or closed roads, there would be no change of effects relative to the existing condition, therefore the effects would be less than effects to access under alternative 2. However, under alternative 3, there could be intermittent disruption of access to the LJCRP area for treatments and therefore disturbance during hunting season. This effect is lower under alternative 3 than alternative 2 since there are fewer acres likely to be treated.

Under alternative 3, there could be greater detrimental effects to recreation uses for fishing, gathering special forest products, and hunting in the long term than alternative 2 since there would be less restoration treatments and a corresponding higher risk of wildfire. As noted in the Wildlife section, prescribed burning in alternatives 2 and 3 would generally benefit elk habitat through forage enhancement. With fewer improvements to ecosystem services from restoration, this would likely have greater impacts on fish and wildlife habitat, water and air quality and plant diversity for recreation uses by people in the analysis area. Effects to the fine sediment aquatic habitat and water temperature under alternative 3 would be less compared to alternative 2 because of a reduction in commercial thinning acres, burning activities, road reconstruction, and temporary road construction. Therefore, effects to recreational fishing are lower under alternative 3 since the activities proposed are unlikely to result in degradation of habitat for redband trout. Under alternatives 1 and 3, negative recreation effects could be greater as the risk of fire is expected to be greater without any or less restoration treatment. For more information on the effects to the specific resources, see the other specialist reports (Aquatics, Wildlife, and Botany analyses).

Vegetation management is needed to return these landscapes to a more natural appearance and higher scenic quality for recreation. More natural, park-like stands, which are substantially less abundant across the landscape than historically, have little likelihood of returning without mechanical restoration treatments to facilitate the reintroduction of fire. Alternative 3 meets the purpose and need to a much lesser extent than the alternative 2.

In the short-term, while prescribed burning treatments take place, smoke could affect the ability to recreate and enjoy the scenery in the Lower Joseph Creek area. With fewer acres to be treated under alternative 3, the short-term impacts are less than alternative 2. However, the FS is not planning to burn during peak visitor season so the impacts are expected to be minimal.

### **Biological Values**

Commenters revealed that they value air and water quality, wildlife, and old growth trees, among others. Due to restoration under alternative 3, improvements to ecosystem services and decreased

risk of wildfire are less than under alternative 2. These biological values would likely be improved more than under alternative 1 but less than under alternative 2 in the long term with less restoration treatments. However, the value for old growth trees is preserved under all alternatives because there is no old tree harvest. Rather than positively impacting this value (it is impossible to increase the amount of old growth trees in the short-term), by not harvesting old growth trees, the value is maintaining its integrity in the community. People will benefit from knowing that the trees exist and are continuing to provide biological services to the forest ecosystem. These non-market values are not included in the quantitative analysis yet have a strong hold in the local communities. For more information on the effects to the specific biological resources, see the other specialist reports (Aquatics, Wildlife, and Botany analyses).

### **Timber Market and Forest Products**

Alternative 3 would add timber to the regional supply and is expected to have positive impacts on the current timber market, though less than the Proposed Action. The timber mills in the area could increase their production within their current mill capacities. AFRC (2014) estimated that the ten mills in the area are operating at an average of 39 percent capacity.

Contacts from the local logging industry believe that the demand for timber products in the region is expected to increase as the products are shipped around the world. Under Alternative 3, this distance and relevant transportation costs could decline as the industry receives more wood from the LJCRP.

### **Non-Market Values**

Under Alternative 3, forest health is expected to improve more than alternative 1 but less than alternative 2. Alternative 3 would decrease the likelihood of crown fire relative to existing conditions more than alternative 1, but less than alternative 2. Over time, forest restoration treatments would decrease fuel load and decrease potential smoke emissions from both planned and unplanned ignitions. The proposed activities under this alternative would protect ecosystem services and other social values, such as recreation opportunities and subsistence uses. Therefore, ecosystem functionality is expected to improve and contribute to community members' non-market values more than alternative 1, but less than alternative 2. For more details on other social values, see the Social Impacts section above.

### **Environmental Justice**

While minority and low-income populations exist in the area, Alternative 3 is not expected to have disproportionately high and adverse human health or environmental effects on these communities. The environmental justice communities expected to be impacted the most are within the Nez Perce tribe. Since this community uses the Lower Joseph area for cultural and religious practices as well as for subsistence uses, they are more vulnerable to changes in the area's natural resources due to the LJCRP. In the long-term, Alternative 3 is expected to improve natural resource conditions less than alternative 2. However, in the short-term, the natural resource uses will be affected less under Alternative 3 than alternative 2 since it involves less treatment. These effects are addressed in the Tribal and Heritage report.

The low income populations in the LJCRP analysis area could be affected by the access to recreation opportunities and resource use. Under Alternative 3, no roads would be decommissioned or closed over the 10 year span of the project, compared to the 23 miles of decommissioned and 15 miles of closed roads under alternative 2. If the low-income populations have to travel greater distances to access recreation, they could incur extra costs since it is more

expensive to reach the forest in indirect ways as access decreases. However, since no roads would be decommissioned or closed under this alternative there are no significant and disproportionate effects on these communities.

Through public meetings, community members and representatives expressed that they expect the LJCRP to improve current environmental justice conditions, specifically related to low-income and children populations. With increased job opportunities for parents, they will be able to provide better opportunities for their children and the expected increase in the tax base under the proposed action alternative will presumably provide more support for schools. An increase in the tax base could also potentially increase social services for low-income populations and help alleviate poverty.

## Heritage

Eligible and potentially eligible sites are located in, or within 200 feet of unit boundaries. Potential effects will be mitigated via monitoring and site protection design features that will be implemented prior to ground disturbance. As for Alternative 2, the greatest threat to heritage resources is ground disturbing activities associated with mechanical treatments. Alternative 3 mechanically treats 3479 acres, which is 40% less than Alternative 2. Therefore, there is less risk to Heritage values under Alternative 3 (see Tables 68 and 90).

Mechanical treatments are the same as Alternative 2; involving ground, sky line and helicopter (?) logging systems that include skidding, construction of temporary roads and landings. Again, Impacts to undiscovered sites could include rutting, erosion, dislocation, or breakage of artifacts and features, and destruction of sites and site stratigraphy.

This alternative provides the greatest degree of public road access involving increased levels of off road uses and dispersed camping increasing the risk of damage to the integrity of heritage resources. Road activities causing rutting and erosion may expose artifacts making them more vulnerable to looting and breakage.

Prescribed fire effects would be the same as alternative 2.

No treatments in IRAs, RHCA and MA15 may mean less potential effects to Cambium Peeled trees and dendroglyphs.

## Tribal

### *Impacts on hunting, fishing and gathering and resource risks of accelerated restoration*

Generally, effects would be the same as alternative 2, but involves approximately half the acres of restoration treatment. In addition, there would be less road decommissioning and there would be an emphasis on meeting public road access needs. The effects of less road decommissioning, along with emphasis on public road access, would be a positive effect for some tribal members who value greater access. Tribal members, concerned more about road impacts to resource values, would likely view alternative 3 as having a greater negative effect than alternative 2.

### *Concern for value of landscape over economic values*

Generally, the effects would be the same as alternative 2, but the estimated economic net value from timber harvest for alternative 3 would be -\$5.1 million, compared to -\$5.9 million for alternative 2. This demonstrates that positive economic net value is not a motivation for this alternative.

*Maintain old growth legacy trees and conservation of inventoried roadless areas*

Alternative 3 would not allow harvest in MA15 stands or IRAs, and does not remove trees greater than 21 inches in diameter. Based on meetings with tribal staff (See Project Record for Tribal Consultation and Coordination Log) effects of alternative 3 on tribal values and concerns are expected to be positive. However, in the long term, threats to old growth and IRA values will likely increase without treatment designed to create resilient landscapes and biological and structural diversity.

*Resource risks of accelerated restoration*

Generally, the effects of alternative 3 would be the same as alternative 2 regarding tribal concerns but potential effects are commensurate with the smaller extent of proposed vegetation treatments. Effects to tribal values in the long term may be more adverse due to reduction of restoration acres treated; including no treatment of threatened old growth and IRAs.

*Impacts to traditional plant resources*

Generally, the effects of alternative 3 would be the same as alternative 2, but less acres of plant habitat will be restored, possibly resulting in declining plant diversity and resiliency.

*Traditional cultural properties, sacred sites, and other traditional use areas, may be at risk from implementation of the LJCRP*

Generally, the effects of alternative 3 would be the same as alternative 2, but at a lesser scale of risk.

## **Recreation**

See effects common to all action alternatives.

Alternative 3 would close approximately 3 more miles of open road as compared to Alternative 1, which would likely lead to no significant difference in recreational use compared to alternative 2.

## **Scenery**

The overall effects of alternative 3 would be similar to alternative 2. Alternative 3 would move stands toward desired future conditions, and reduce the risk of uncharacteristic fire, but to a lesser degree than alternative 2. Effects to scenic integrity would be kept to a minimum, meeting all Forest Plan, HCNRA CMP, and Joseph Creek Wild and Scenic River Management Plan standards.

Alternative 3 would treat 13 percent of the project area (23% of forested acres) to improve species composition, stand density, and reduce ladder fuels and canopy closure. These treatments would improve scenic stability from low (dry forest PVG) or moderate (moist forest PVG) to high, but to a lesser degree than alternative 2. The following discussion discloses effects of alternative 3 by viewshed.

## **Oregon State Highway 3, Joseph Canyon Overlook**

The direct effects of alternative 3 in this viewshed are the same as alternative 2, except no forest treatments would occur in RHCAs, and no trees greater than 21" would be cut. Alternative 3

would improve species composition, stand density, and reduce ladder fuels and canopy closure to a slightly lesser degree than alternative 2.

The one unit (#193) partially in the background view of Highway 3 would not have a single tree selection harvest, but the intermediate treatment would occur on approximately 10 acres. This treatment would not change the density class of the stand, and would not be visibly evident from the Joseph Canyon Overlook.

#### **Joseph Canyon Wild and Scenic River Corridor**

The direct effects of alternative 3 would be the same as alternative 2, except no forest treatments would occur in RHCAs, and no trees greater than 21" would be cut. There would be 10 fewer acres treated in the middleground view (visual quality objective of Partial Retention in the Table Rock area) than alternative 2. This effort would improve the scenic character and the scenic stability of the area to generally the same degree as alternative 2.

#### **Table Mountain**

The effects of alternative 3 would generally be the same as alternative 2, except no forest treatments would occur in RHCAs, and no trees greater than 21" would be cut. There would be 10 fewer acres treated in this area than alternative 2, and there would be a slightly lower reduction in risk of uncharacteristic fire where more trees are left on the landscape due to the 21" dbh cutting limit. The scenic character and the scenic stability of the area would be improved to a slightly lower level in this viewshed than alternative 2.

#### **Forest Road 46, Cold Spring Ridge/Forest Road 4680**

The direct effects of alternative 3 would be the same as alternative 2, except no forest treatments would occur in MA15, IRAs, or RHCAs, no trees greater than 21" would be cut, and FS Road 4600570 would not be decommissioned. These differences would result in very little difference in effect on visual quality, except in the case of scenic stability. Leaving more trees on the landscape, and not breaking up the horizontal homogeneity and ladder fuels of the IRAs, MA15, and RHCA areas would result in higher risk of uncharacteristic stand replacement fire compared to alternative 2, but lower risk relative to alternative 1 (no action).

It is expected that alternative 3 would not reduce the scenic integrity and thus retain the existing visual quality objective standards established in the Forest Plan, CMP (HCNRA) and the Joseph Creek Wild and Scenic River Management Plan.

#### ***Potential Wilderness Areas and Inventoried Roadless Areas***

See effects for Alternative 1 as no treatment is proposed in PWA or IRA.

#### ***Other Undeveloped Land***

See effects analysis for Alternative 2 with the following change in acres affected for Alternative 3 (Tables 99 and 100) The description of effects are similar to Alternative 2, however, the intensity (number of acres affected) is slightly less because less harvest and SI would occur in Alternative 3.

**Table 99. Change in acres of other undeveloped land in Alternative 3**

	Acres of Other Undeveloped Land	Acres affected by Harvest or SI	Acres Remaining	Percent Change
IRA	16,054	0	16,054	0%
Non-IRA	24,865	4,086	20,779	-16%

**Table 100. Change in size class distribution acres of other undeveloped land in Alternative 3.**

Number of Polygons		Size Class	Approximate Acres	
Existing	Alternative 3		Existing	Alternative 3
253	255	1 to 99 acres	3,826	3,646
30	26	100 to 499 acres	5,747	5,286
7	8	500 to 999 acres	5,249	5,570
11	9	1,000 to 4,999 acres	26,097	22,594
0		5,000+ acres	0	0
301	297	<b>Total</b>	40,919	37,096

*Areas Identified as Unroaded by Environmental Organizations*

See effects analysis for Alternative 2 with the following change in acres affected for Alternative 3 (Table 101). The description of effects are similar to Alternative 2, however, the intensity (number of acres affected) is slightly less because less harvest and SI would occur in Alternative 3.

**Table 101. Change in acres of areas identified as unroaded by environmental organizations (UEO) and influence of past harvest and system roads.**

Environmental Organizations Unroaded Area Name	Acres outside of IRA, PWA, and other undeveloped land	Acres outside (IRA, PWA other undeveloped land) intersecting past harvest (1974 – 2009) FACTS Database	Acres outside (IRA, PWA, other undeveloped land and past harvest) intersecting 300' road influence zone	Acres outside treated with Harvest/SI – Alternative 3	
				Harvest	SI
Joseph Canyon	4,628	3,761	6	1,202	450
Cottonwood Creek – Broady Creek	1,456	850	1	197	43
Sumac Creek	235	13	0	40	0
Yew Wood Springs	329	127	0	156	1
Boner Gulch	173	26	0	43	0
<b>Total</b>	<b>6,821</b>	<b>4,778</b>	<b>7</b>	<b>1638</b>	<b>494</b>

## Cumulative Effects

Alternative 3 restoration treatments would contribute an additional 12,493 acres toward moving forest composition, structure, density toward desired conditions or enhancing forest pattern or size class distribution or improving trends in insect and disease susceptibility.

### Physical environment

The cumulative effects of alternative 3 would be essentially the same as for alternative 2, but they would be proportional to the area treated in the short term (less area treated in alternative 3 than 2). Over the long term, relative effects between alternatives 2 and 3 would be proportional to the area effectively restored toward HRV (alternative 3 less than alternative 2).

### Air Quality

See cumulative effects under Alternative 2.

### Disturbance and Fire Regime

Past harvest, fuels treatment, prescribed fire and wildfire have influenced the character of the natural fire regimes found in LJCRP depending on their objectives and outcomes. In general each of these activities helped shape the affected environment and existing conditions for this project area, along with past grazing and fire suppression. In general the cumulative effect of past harvest (assuming that it was not overstory removal of early seral species) have served to promote restoration objectives by predominantly reducing density and associated mortality effects. In some cases group selection was used as a harvest method which would facilitate the ability of early seral regeneration. Fuels treatments and prescribed fire are targeted to reduce the probability of high severity fire and restore natural disturbance regimes. Wildfire is generally of higher severity than the natural regimes, except for the case of non-forest areas within the project, therefore wildfires influence often further departs from the range of variability of forest structure, density, and composition by simplifying at multiple scales (landscape and stand).

The treatments proposed in the LJCRP in conjunction with past beneficial even with past adverse treatments would promote the re-introduction of fire at a natural and ecologically appropriate scale and severity.

### *Fire Management Decision Space*

Past management actions and wildfires cumulatively affect fire managements' ability to confidently return fire as an ecological process. Utilizing areas of reduced fire behavior, typically identified by past treatment and wildfire, can often decrease the risk (safety, social and ecological) of allowing an unplanned ignition to perform an ecologically important role and restore a natural disturbance regime. These past actions alongside treatments identified in Alternative 3 would facilitate somewhat limited acceptance of characteristic wildland fire and its ecological role in restoring disturbance processes in the LJCRP area. This is due in part to the large areas of untreated and ecologically important land that would continue to depart from historic disturbance severity and behavior. Adverse effects to these areas may not be socially or ecologically desirable given the expected effects of wildfire therefore the decision space is narrowed when fire occurs within or around these specific areas.

## Wildlife

The vegetation treatments proposed in alternative 2 would negatively impact current and future dead and defective wood habitat to a greater degree than alternative 3. The thinning and fuels treatments proposed, are additive to other similar projects in the larger cumulative effects area. These treatments add to the needs for hazard tree falling along roads and will alter or remove dead and defective wood habitat.

## Socioeconomics

**Access:** Effects to access to WWNF land was an issue brought up through public comments and meetings. The attitude towards the LJCRP from a subsection of the community is generally negative because, although it may not contain significant access restrictions, the LJCRP is seen as an addition to the previous restrictions put in place and is viewed as a trend towards limiting access to public lands. Travel management planning on the WWNF is on-going and this could change cross-country travel and the existing network of roads on the Forest. If some roads on the WWNF are closed in the future for cross-country travel, commenters expressed that the value of maintained roads would increase. Under Alternative 3, the cumulative effects on access to FS lands are less than the effects from alternative 2 since there are no new closures or decommissioned roads.

**Treatment and Restoration:** The effect of past, present and reasonably foreseeable treatment activities in the project area would improve forest health relative to existing conditions even without the implementation of LJCRP. From 2004 to 2013, approximately 1,320 acres have been commercially harvested in the Lower Joseph area. Under Alternative 3, 9,880 acres are expected to be commercially harvested over the ten year span of the project. Under Alternative 3, the activity in the forest sector would be higher than present and the associated local economic impact of current and future restoration activities would increase from the present conditions. The estimated employment and income consequences of non-LJCRP treatment activities, therefore, are likely underestimated in the related environmental compliance documents if they depend on present conditions for those analyses.

The LJCRP treatments and other ongoing and foreseeable treatments could increase exposure to smoke emissions, which could cause cumulative effects to health and quality of life for individuals who are sensitive to smoke. From 2004 to 2013, approximately 592 acres have been broadcast burned and 23,752 acres have incurred wildfire in the Lower Joseph area. Under Alternative 3, up to 50,000 acres are expected to be broadcast burned over the ten year span of the project. However, the cumulative effect of these treatments would be to decrease the risk of uncharacteristic wildfire, which would decrease the probability of smoke emissions associated with these events.

**Recreation:** Other on-going and reasonably foreseeable vegetation treatments in the project area will reduce the opportunities for substitute behavior when the preferred recreation site is unavailable. As a result, individuals may choose to stay home, which would decrease visitor spending and consumer surplus to a greater extent than estimated in the direct and indirect effects analysis. However, the cumulative effects to the social and economic impacts from recreation cannot be precisely described. Based on the available information, the effect to visitor spending and consumer surplus from on-going and reasonably foreseeable actions is not expected to change. Although Alternative 3 will likely have less short-term disturbances to recreation (from smoke and limited access) than the Proposed Action, the long term effects to recreation will be also be less improved viewsheds and opportunities to recreate in a healthy forest with reduced risk of wildfire.

## Heritage

Relatively speaking, alternative 3 may pose a lower cumulative risk to heritage values over time as it proposes about half of the area of mechanical treatments, and will most likely be implemented not as far into the future as Alternative 2. However, overall, the cumulative effects on heritage resources as a result of alternative 3 is not considered to be adverse due to compliance with Section 106 of the National Historic Preservation Act (cite), the 2004 Programmatic Agreement (2004) design criteria, and mitigation and development of site protection implementation plans .

## Tribal

See hydrology, wildlife, botany and fisheries sections for complete cumulative effects analysis relative to these treaty resources.

## Potential Wilderness Area, Inventoried Roadless Areas, and other Undeveloped Lands

Cumulative effects for PWAs and IRAs would be the same as disclosed in Alternative 1. Cumulative effects to other undeveloped lands and UEO would be the same as disclosed in Alternative 3. The description of effects are similar to Alternative 2, however, the intensity (number of acres affected) is slightly less because less harvest and SI would occur in Alternative 3.

## Cumulative Effects – Present and Foreseeable Vegetation Management Activities

There are no vegetation management, fuels treatment and prescribed burning activities that are ongoing (as of 2014) or are foreseeable within the project area.

## Unavoidable adverse effects

No unavoidable adverse effects have been identified.

## Irreversible/Irretrievable Commitments of Resources

No irreversible or irretrievable commitments of resources would occur as a result of this project.

## Alternative 2 and 3 – Effects of Not Amending the Forest Plans

The following is a description of how the forest plan amendments under this EIS would modify the forest plans standards and guidelines and what the effects to the vegetation resource would be if the amendment did not occur.

- Alternative 2 - Wildlife Standard (The Eastside Screens – Regional Forester’s Amendment # 2 for the Wallowa-Whitman Land and Resource Management Plan (forest plan)). The amendment would authorize: a) Some of the large, but young, Douglas-fir, and grand fir trees that are  $\geq 21$  inches dbh, but less than 150 years in age (at breast height), would be removed from any of the structural stages being treated, except for units classified as the old forest single stratum structural stage (OFSS; this stage is called “single stratum with large trees” in the Screens); b) Thinning treatments would occur in OFSS.

o If the amendment did not occur: a) Restoration treatments would be limited to a maximum of 21" dbh thereby reducing the ability to restore forest structure and composition toward reference conditions (HRV), particularly to increase the abundance of shade-intolerant tree species (ponderosa pine and western larch), reduce the risk of uncharacteristically severe fire and insect and disease outbreaks, and increase resiliency to natural disturbance and climate change; b) Restoration treatments would not occur in the OFSS structural stage thereby negating the ability ensure maintenance and persistence of the large tree component into the future (in terms of improved tree vigor and resistance to western pine beetle attack and future wildfire risk or resiliency to climate change); contribute to species composition objectives for the LJCRP; contribute to density objectives for the LJCRP.

- Alternative 3 - - Wildlife Standard (The Eastside Screens – Regional Forester’s Amendment # 2 for the Wallowa-Whitman Land and Resource Management Plan (forest plan)). The amendment would authorize: a) Thinning treatments would occur in OFSS.

o If the amendment did not occur: a) Restoration treatments would not occur in the OFSS structural stage thereby negating the ability ensure maintenance and persistence of the large tree component into the future (in terms of improved tree vigor and resistance to western pine beetle attack and future wildfire risk or resiliency to climate change); contribute to species composition objectives for the LJCRP; contribute to density objectives for the LJCRP.

## Other Required Disclosures

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ...other environmental review laws and executive orders.”

## Preparers and Contributors

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and other organization and individuals during the development of this environmental impact statement:

### U.S. Forest Service Blue Mountains Restoration Strategy Interdisciplinary Team

Member	Title	Responsible Sections
Paul Boehne	Fisheries Biologist	Aquatics, Transportation
Michael Brown	Physical Scientist	Soils, Watershed, Minerals, Lands, GIS
Linda Dillavou	Support Assistant	Administrative support.
Jenifer Ferriel	Ecologist/Botanist	Ecology, Range, Native and Invasive Plants
Amy Gowan	Social Scientist	Tribal, Socioeconomics, Heritage
Miles Hemstrom	Scientist, Institute for Natural Resources	Ecological Modeling
Jodi Kramer	Public Affairs Officer, Wallowa-Whitman National Forest	External Communication
Kristen Loughery (TEAMS)	Economist	Socioeconomics
John Manderscheid	Civil Engineering Technician	Travel Access
Neil McCusker	Silviculturist	Silviculture, Climate Change
Lonnie Ruchert	Civil Engineering Technician	Travel Access
Glen Sachet	Public Affairs Specialist, R6	Communications
Ayn Shlisky	Team Lead	Team Management, Environmental Coordination
Brian Spradlin	Disturbance Ecologist	Fire Ecology, Fuels, Air, Wilderness, IRAs, Environmental Coordination
Kris Stein	District Ranger	Oversight, Direction
Barb Wales	Wildlife Biologist	Wildlife, Recreation
Eric White	Research Associate (Ecosystem Workforce Program, Univ. of Oregon)	Socioeconomics
Darcy Weseman	Support Services Supervisor	Administrative support
Chris Zanger	Forest Analyst (The Nature Conservancy)	Fire Modeling

### Federal, State, and Local Agencies

National Marine Fisheries Service, Northwest Region  
US Fish and Wildlife Service

### Tribes

Nez Perce Tribe

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# Glossary

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## A

**active management:** Planned, intentional actions in an area that are specifically designed to obtain a desired objective or result.

**active restoration:** Refer to restoration.

**administrative site:** Areas such as work centers, fire lookouts, permitted ranch headquarters, seed orchards, communication sites, utility corridors, developed campgrounds, and other areas that are occupied or used by the Forest Service during the administration of work associated with national forest lands.

**adaptive management:** An approach to natural resource management in which decisions are made as part of an ongoing process. Adaptive management involves planning, implementing, monitoring, evaluating, and incorporating new knowledge into management approaches based on scientific findings and the needs of society.

Effects are monitored for the purpose of learning and adjusting future management actions, which improves the efficiency and responsiveness of management.

**administrative unit:** A management area such as the Wallowa-Whitman National Forest, under the administration of one line officer. Forest Service line officers include district rangers and forest supervisors.

**air pollutant:** Any substance in air that could, if in high enough concentration, harm humans, animals, vegetation, or material. Air pollutants may include almost any natural or artificial matter capable of being airborne, in the form of solid particles, liquid droplets, gases, or a combination of these.

**air quality:** The composition of air with respect to quantities of pollution therein, used most frequently in connection with standards of maximum acceptable pollutant concentrations.

**allotment (grazing):** Area designated for the use of a certain number and kind of livestock grazing for a prescribed period.

**allotment management plan (AMP):** A document that specifies the actions to be taken to manage and protect the rangeland resources and reach a given set of objectives.

**all-terrain vehicle (ATV):** Off-highway-vehicles with less than or equal to a 50 inch wheel base, three or more low-pressured tires, handle bar steering and a seat designed to be straddled.

**amenity:** Resource use, object, feature, quality, or experience that is pleasing to the mind or senses; typically refers to values for which monetary values are not or cannot be established, such as scenic or wilderness values.

**anadromous fish:** Fish that hatch in fresh water, migrate to the ocean, mature there, and return to fresh water to reproduce; for example, salmon and steelhead.

**analysis file:** A file containing records of the scoping and analysis processes conducted during the preparation of a NEPA document. The file is typically stored at the Forest Service office from which a final decision is issued.

**animal unit:** One mature cow of approximately 1,000 pounds, either dry or with calf up to 6 months of age, or the equivalent (one horse, five domestic sheep). This concept is based on a standardized amount of forage consumed.

**animal unit month (AUM):** The amount of forage required by one mature (1,000 lb.) cow or its equivalent for one month (based upon average forage consumption of 26 lb. of dry matter per day). Refer to head month.

**anthropogenic:** Caused or produced through the agency of man; the scientific study of the origin of man.

**aquatic:** Pertaining to water.

**aquatic ecosystem:** Waters that serve as habitat for interrelated and interacting communities and populations of plants and animals. The stream channel, lake or estuary bed, water, biotic communities and the habitat features that occur therein.

**assessment:** The collection, integration, examination, and evaluation of information and values.

**authorized grazing:** Refer to grazing permit.

## B

**basal area:** The cross-sectional area of the trunk of a tree or stand of trees at breast height (4.5 feet).

**basalt:** A finely or fine grained, dark, dense volcanic rock.

**basin (river):** (1) In general, the area of land that drains water, sediment, and dissolved materials to a common point along a stream channel. River basins are composed of large river systems; (2) the term refers to the equivalent of a 3rd-field hydrologic unit code, an area of about nine million acres, such as the Snake River Basin.

**benches:** Mid-elevation flat or gently sloping sites. Grazing and homesteading/ranching activities were concentrated in these areas, which were also used by American Indians for pasturing livestock. Benches from 2,000 to 4,500 feet generally have potential to support the bunchgrass associations described for the lower and mid-position slopes. Cheatgrass brome, Kentucky bluegrass, and an assortment of annual and perennial forbs (including some noxious weeds) dominate much of the benchland, some of which was severely disturbed by early farming and ranching activities.

**beneficial uses:** Any of the various uses which may be made of the water, including, but not limited to, domestic water supplies, fisheries and other aquatic life, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics.

**best management practices (BMPs):** Practice or set of practices that enable a planned activity to occur while still protecting the resource managed, normally implemented and applied during the activity rather than after the activity.

**best management practices (BMPs) (Watershed):** A practice or a combination of practices, that is determined by the state (or designated area-wide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing, or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

**big game:** Those species of large mammals normally managed as a sport hunting resource. Generally includes; elk, moose, white-tailed deer, mule deer, mountain goat, bighorn sheep, black bear and mountain lion.

**biological diversity (biodiversity):** The variety and variability among living organisms and the ecological complexes in which they occur.

**biological soil crust:** Thin crust of living organisms on or just below the soil surface composed of dense, low-growing community of various combinations of algae, mosses, liverworts, cyanobacteria (blue-green algae), micro fungi, bacteria, and lichens; and provide important components of grassland, shrub-steppe, and subalpine habitats. Also referred to as cryptogammatic or microbiotic crust.

**biophysical:** The combination or grouping of biological and physical components in an ecosystem.

**biotic:** Living.

**biomass:** Dry weight of organic matter in plants and animals in an ecosystem, both above and below ground.

**broad scale:** A large, regional area, such as an entire river basin and typically a multi-state area.

**browse:** That part of leaf and twig growth of shrubs, woody vines, and trees available for animal consumption.

**Bureau of Land Management (BLM):** An agency within the U.S. Department of the Interior with land management responsibility for the public domain lands.

## C

**candidate species:** Plant and animal species that may be proposed for listing as endangered or threatened in the future by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS); these species have no legal protection under the Endangered Species Act (ESA).

**canopy:** In a forest, the branches from the uppermost layer of trees; on rangeland, the vertical projection downward of the aerial portion of vegetation.

**canopy cover:** The proportion of the forest floor covered by the vertical projection of the tree crowns.

**capability:** The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at a given level of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology, as well as the application of management practices, such as silviculture or protection from fire, insects, and disease.

**capital investment:** An input that increases the stock of natural or man-made resources (assets) needed to maintain or increase the flow of outputs in the future. Benefits resulting from capital investments are normally recouped in excess of one year; activities that create or improve capital assets to obtain benefits occurring during several planning periods.

**carrying capacity:** The number of animals or plants that can be maintained over a specific period of time on a specified amount of land without damage to either the organisms or the habitat.

**cavity:** The hollow excavated in a tree that is used by birds or mammals for roosting and/or reproduction.

**ceded lands:** Lands that American Indian tribes ceded to the United States by treaty in exchange for reservation of specific land and resource rights, annuities, and other promises in the treaties.

**channel (stream):** The deepest part of a stream or riverbed through which the main current of water flows.

**channel morphology:** The dimension (width, depth), shape and pattern (sinuous, meandering, straight) of a stream channel.

**class I airshed:** Under the Clean Air Act amendments, all international parks, national parks larger than 6,000 acres, and national wilderness areas larger than 5,000 acres which existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional air pollution that can be added to these areas.

**climax:** The final or mature seral stage in secondary plant succession that persists for an indefinite period of time if no major disturbances occur.

**closed canopy:** Greater than or equal to 60 percent canopy cover within the moist and cold upland forest potential vegetation groups; greater than or equal to 40 percent canopy cover within the dry upland forest potential vegetation group.

**coarse woody material or debris:** Pieces of woody material derived from tree limbs, boles, and roots in various stages of decay, having a diameter of at least three inches.

**Code of Federal Regulations (CFR):** A codification of the general and permanent rules published in the Federal Register (FR) by the executive departments and agencies of the federal government.

**cold forest:** High elevation forests dominated by subalpine fir, whitebark pine, spruce, and sometimes lodgepole pine.

**collaboration:** Working together; to cooperate willingly with an agency or instrumentality with which one is not immediately connected.

**community resiliency:** The ability of communities to adapt to changing ecological, social, and economic conditions.

**compaction:** Making soil hard and dense and decreasing its ability to support vegetation because the soil can hold less water and air and because roots have trouble penetrating the soil.

**compatible:** Capable of existing together in harmony.

**comprehensive management plan (CMP):** The document that establishes the array, levels, and manner of resource uses within the Hells Canyon National Recreation Area on the Wallowa-Whitman National Forest. It was incorporated in 2003 as a part of the 1990 Land and Resource Management Plan.

**connectivity:** The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. Connectivity is the opposite of fragmentation.

**conservation strategy or agreement:** Plans to remove or reduce threats to candidate and sensitive species of plants and animals so that a listing as threatened or endangered is unnecessary.

**consultation:** (1) An active, affirmative process that (a) identifies issues and seeks input from appropriate American Indian governments, community groups, and individuals; and (b) considers their interests as a necessary and integral part of the Forest Service's decision-making process; (2) the federal government has a legal obligation to consult with American Indian tribes. This legal obligation is based in such laws as the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, and numerous other executive orders and statutes. This legal responsibility is, through consultation, to consider Indian interests and account for those interests in the decision; (3) the term also refers to a requirement under Section 7 of the Endangered Species Act (ESA) for federal agencies to consult with the USFWS and/or NOAA-Fisheries with regard to federal actions that may affect listed threatened and endangered species or critical habitat.

**core area:** The combination of core habitat (i.e., habitat that could supply all elements for the long-term security of species of conservation concern) and a core population (a group of one or more local populations that exist within core habitat) constitutes the basic unit on which to gauge recovery within a recovery unit. Core areas require both habitat and the species of conservation concern, and the number (replication) and characteristics of local populations inhabiting a core area provide a relative indication of the core area's likelihood to persist. A core area represents the closest approximation of a biologically functioning unit.

**corridor:** A tract of land forming a passageway. Can refer to areas of wildlife movement, boundaries along rivers, or the present or future location of transportation or utility rights-of-way within its boundaries.

**cost efficiency:** The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts, are not assigned monetary values but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate.

**Council on Environmental Quality (CEQ):** An advisory council to the President established by the National Environmental Policy Act (NEPA) of 1969. The council reviews federal programs for their effects on the environment, conducts environmental studies, and advises the President on environmental matters.

**cover:** (1) Trees, shrubs, rocks, or other landscape features that allow an animal to conceal itself partly or fully for protection from predators, or to ameliorate conditions of weather, or in which to reproduce; (2) the area of ground covered by plants of one or more species.

**cover type:** A vegetation classification depicting a genus, species, group of species, or life form of tree, shrub, grass, or sedge of an area.

**crown:** The part of a tree containing live foliage; treetops.

**cubic feet per second (cfs):** A rate of the flow, in streams and rivers, for example. It is equal to a volume of water one foot deep and one foot wide flowing a distance of one foot in one second. One cfs is equal to 7.48 gallons of water flowing each second.

**Ccf:** 100 cubic feet. It is equal to roughly 2 times the board foot estimate. Sometimes referred to as cubit.

**cubic feet per second per square mile (CSM):** The rate of streamflow per unit land area.

**culture:** The ideals, values, and beliefs that members of a society share to interpret experience and generate behavior that is reflected by their work and thought (Haviland 1999).

**cultural resources:** An object or definite location of human activity, occupation, or use identifiable through field survey, historical documentation, or oral evidence. Cultural resources are prehistoric, historic, archaeological, or architectural sites, structures, places, or objects and traditional cultural properties. Cultural resources include the entire spectrum of resources for which the Heritage Program is responsible, from artifacts to cultural landscapes, without regard to eligibility for listing on the National Register of Historic Places

**cumulative effects or impacts:** Cumulative effects or impacts are the impacts on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Effects and impact are synonymous (40 CFR 1508.7).

**current direction:** The existing direction in approved management plans; continuation of existing policies, standards and guidelines; current budget updated for changing costs over time; and, to the extent possible, production of current levels and mixes of resource outputs.

## D

**decommission (road):** Permanently closing a road to vehicular use and left in a hydrological maintenance free condition. Decommissioning will include activities such as water barring, out sloping, recontouring, decompaction of road surface, removal of drainage structures, and road barricades as needed. Decommissioning removes the road from the transportation system data base and is no longer used to calculate maintenance costs for the transporation system.

**deferred maintenance:** Maintenance that was not performed when it should have been or when it was scheduled and which, therefore, was put off or delayed for a future period. When allowed to accumulate without limits or consideration of useful life, deferred maintenance leads to deterioration of performance, increased costs to repair, and decrease in asset value. Deferred maintenance needs may be categorized as critical or noncritical at any point in time. Continued deferral of noncritical maintenance will normally result in an increase in critical deferred maintenance. Code compliance (such as safety, ADA, OSHA, or environmental), plan direction, best management practices, biological evaluations other regulatory or executive order compliance requirements, or applicable standards not met on schedule are considered deferred maintenance.

**demography:** The statistical study of populations, especially with reference to size and density, distributions, and vital statistics such as births, and deaths.

**departure:** The difference between an existing condition and the desired condition.

**density (stand):** The number of trees growing in a given area, usually expressed in terms of trees per acre.

**design criteria:** Provides the parameters, including guidelines, for how future site-specific activities can occur within the context of the plan.

**designated critical habitat:** Specific areas within the geographical area occupied by a species at the time of listing under Endangered Species Act that contain physical or biological features essential to the conservation of the species.

**desired condition:** A portrayal of the land or resource condition that is expected to result if goals and objectives are fully achieved.

**developed recreation:** Recreation that requires facilities that in turn result in concentrated use of an area; for example, a campground. Examples of developed recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings.

**developed site:** Facility provided for developed recreation use. Refer to facilities.

**diameter at breast height (d.b.h.):** Tree diameter measured at 4.5 feet from the ground.

**direct effects:** Impacts on the environment caused by the action and occur at the same time and place.

**disease:** A harmful deviation from normal functioning of physiological processes, usually pathogenic or abiotic in origin.

**disjunct:** Populations that are separated geographically from the main distribution of a species. Many plants with disjunct populations are biologically unique because they are not found again for dozens to over one hundred miles. Disjunct populations are thus rare in this portion of their distribution.

**dispersed (recreation):** Recreation that does not occur in a developed recreation site; for example, hunting or backpacking.

**dispersed campsites:** Primitive sites typically used for overnight, dispersed recreation. Usually includes a hardened area around a fire pit, a barren area, and/or user-constructed facility.

**disturbance:** Events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, and insects and diseases. Human-caused disturbances include, among others, actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species.

**disturbance process:** Events that alter the structure, function, or composition of aquatic or terrestrial habitats.

**disturbance regime:** Natural pattern of periodic disturbances, such as fire or flood, followed by a period of recovery from the disturbance such as growth of a forest after fire.

**diversity:** The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

**down woody material:** A tree or part of a tree that is dead and laying on the ground.

**draft environmental impact statement (DEIS):** The draft statement of predicted environmental effects that is required for major federal actions and released to the public and other agencies for comment and review.

**dry forest:** Low elevation forest dominated by ponderosa pine and sometimes Douglas-fir or grand fir.

## E

**early seral:** Refer to seral stages.

**early spring:** Early spring is defined as that period when the perennial cool-season forage plants initiate growth and begin shoot elongation. It extends through the period of maximum carbohydrate use and the beginning of carbohydrate storage. The end of this period is determined by soil moisture. It ends prior to the time that soil moisture is expected to become limiting to the extent that essentially full regrowth cannot be ensured.

**Eastside Screens:** Regional Forester's Amendment 1, Interim management direction establishing riparian, ecosystem, and wildlife standards for timber sales on NFS lands in eastern Oregon and Washington (USDA Forest Service 1994).

**ecological function:** Refer to ecological processes.

**ecological integrity:** In general, ecological integrity refers to the degree to which all ecological components and their interactions are represented and functioning; the quality of being complete; a sense of wholeness. Absolute measures of integrity do not exist. Proxies provide useful measures to estimate the integrity of major ecosystem components (forestland, rangeland, aquatic, and hydrologic). Estimating these integrity components in a relative sense for an area helps to explain current conditions and to prioritize future management. Thus, areas of high integrity would represent areas where ecological functions and processes are better represented and functioning than areas rated as low integrity.

**ecological processes:** The flow and cycling of energy, materials, and organisms in an ecosystem. Examples of ecosystem processes include the carbon and hydrologic cycles, terrestrial and aquatic food webs, and plant succession, among others.

**ecological status:** The degree of departure of current vegetation from the potential natural vegetation, or potential natural community often synonymous with seral stage.

**economics:** A social science concerned primarily with description, distribution, and consumption of goods and services.

**economic well-being:** A condition that enables people to work, provide income for their families, and generate economic wealth to local communities, the region, and the nation.

**economic efficiency:** Producing goods and services in areas best suited for that production based on natural biophysical advantage or an area's ability to best serve regional demands of people.

**economic impacts:**

**direct economic impact:** Effects caused directly by forest product harvest or processing or by forest uses.

**indirect economic impact:** Effects that occur when supporting industries sell goods or services to directly affected industries.

**induced economic impact:** Effects that occur when employees or owners of directly or indirectly affected industries spend their income within the economy.

**economy:** System of production, distribution, and consumption of economic goods.

**ecosystem:** A complete, interacting system of living organisms and the land and water that make up their environment; the home places of all living things, including humans.

**ecosystem diversity:** The variety and relative extent of ecosystem types, including their composition, structure, and processes within all or a part of an area of analysis.

**ecosystem management:** The use of an ecological approach to achieve multiple-use management of public lands by blending the needs of people and environmental values in such a way that lands represent diverse, healthy, productive, and sustainable ecosystems.

**ecosystem function (processes):** The major process of ecosystems that regulate or influence the structure, composition, and pattern. These include nutrient cycles, energy flows, trophic levels (food chains), diversity patterns in time/space development and evolution, cybernetics (control), hydrologic cycles and weathering processes.

**ecosystem health:** A condition where the parts and functions of an ecosystem are sustained over time and where the system's capacity for self-repair is maintained, such that goals for uses, values, and services of the ecosystem are met.

**ecosystem sustainability:** The ability to sustain diversity, productivity, resilience to stress, health, renewability and/or yield of desired values, resource uses, products, or services from an ecosystem, while maintaining the integrity of the ecosystem over time.

**edge:** An area where plant communities meet or where successional stages or vegetation conditions within the plant communities come together.

**effects:** Environmental changes resulting from an action. Included are direct effects, which are caused by the action and occur at the same time and place, and indirect effects, which are caused by the action and are later in time or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or healthy effects, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects even if on balance the agency believes that the effects will be beneficial (40 CFR 1508.8, 2).

**eligible wild and scenic rivers:** River segments that have been identified as eligible for inclusion in the national Wild and Scenic Rivers System under the authority of the Wild and Scenic Rivers Act. The river segment must be free-flowing and it must possess one or more outstandingly remarkable scenic, recreational, geological, fish and wildlife, historical, cultural, ecological or other value.

**embeddedness:** The degree that larger streambed particles (boulders, rubble, or gravel) are surrounded or covered by finer particle sizes such as fine sediment (Rhodes et al. 1994).

**emission:** A release of air contaminants into the outdoor atmosphere.

**endangered species:** Species listed under the Endangered Species Act by either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range.

**endemic:** Occurring naturally in a certain region and distribution is relatively limited to a particular locality. Endemism is the occurrence of endemic species in an area.

**environmental assessment (EA):** A comprehensive evaluation of actions and their predictable short- and long-term environmental effects, which include physical, biological, economic, social, and environmental design factors and their interactions. It is a formal document that must follow the requirements of NEPA, the CEQ, and guidelines and directives of the agency responsible for the project proposal.

**environmental impact statement (EIS):** A statement of the environmental effects of a proposed action and alternatives to it. It is required for major federal actions under Section 102 of the National Environmental Policy Act (NEPA), and released to the public and other agencies for comment and review. A draft EIS is released to the public and other agencies for review and comment. A final EIS is issued after consideration of public comments. A record of decision is based on the information and analysis in the final EIS.

**ephemeral:** A channel in which streamflow occurs inconsistently, infrequently, or seasonally and, except during periods of streamflow, does not intersect the local groundwater table.

**erosion:** The wearing away of the land surface by running water, wind, ice, gravity, or other geological activities; can be accelerated or intensified by human activities that reduce the stability of slopes or soils.

**essential fish habitat:** Identification by the National Marine Fisheries Service (NMFS) of habitat essential to conserve and enhance federal fishery resources that are fished commercially under the Magnuson-Stevens Fishery Conservation and Management Act.

**evaluation:** An essential companion activity to monitoring; the tool for translating data gathered by monitoring into useful information that could result in change or adaptive management.

**even-aged management:** The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (and, therefore, tree sizes) throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

**evolutionarily significant units (ESU):** The minimal unit of conservation management, the smallest population unit that can receive federal protection under the Endangered Species Act. An ESU is a set of populations that is morphologically and genetically distinct from other similar populations or a set of populations with a distinct evolutionary history.<sup>18</sup>

**exotic species:** A plant or animal species introduced from a distant place; not native to the area.

**extinction:** Complete disappearance of a species from the earth.

**extirpation:** Loss of populations from all or part of a species' range within a specified area.

## F

**facility:** A single or contiguous group of improvements that exists to shelter or to support Forest Service programs. The term may be used in either a broad or narrow context; for example, a facility may be a ranger station compound, lookout tower, leased office, work center, separate housing area, visitor center, research laboratory, recreation complex, utility system, or telecommunications site.

**upgrade:** Total redesign and construction of a camping facility. Location may change considerably depending on ecological, environmental, or social concerns. The overall goal would be to maintain a rustic appearance but promote designs and materials that would result in lower operation and maintenance costs. Some campground classifications may change to the next higher level but none would exceed a Level 4 site development for this planning period. Accessibility standards would be appropriate to the designated Recreation Opportunity Spectrum (ROS). A change in design standards has the potential to move the ROS to a higher development setting although that is not the intent of upgrading a facility.

<sup>18</sup> <http://darwin.eeb.uconn.edu/eeb310/lecture-notes/systematics/systematicsl3.html>

**facilities maintenance (annual):** Work performed to maintain serviceability, or repair failures during the year in which they occur. Includes preventive and/or cyclic maintenance performed in the year in which it is scheduled to occur. Unscheduled or catastrophic failures of components or assets may need repaired as a part of annual maintenance.

**preventive maintenance:** Scheduled servicing, repairs, inspections, adjustments, and replacement of parts that result in fewer breakdowns and fewer premature replacements, and help achieve the expected life of the fixed asset. Inspections are a critical part of preventive maintenance as they provide the information for scheduling maintenance and evaluating its effectiveness.

**facilities maintenance (deferred):** Work that was not performed when it should have been or when it was scheduled and has been delayed to a future period. Deferred maintenance includes actions not taken to comply with codes for health and safety, accessibility, environmental factors and other compliance requirements or applicable standards. To reduce or eliminate deferred maintenance, rehabilitation or replacement may be necessary.

**rehabilitation:** Renovation or restoration of an existing fixed asset or any of its components in order to restore the functionality or life of the asset. Because there is no significant expansion or change of purpose for the fixed asset, the work primarily addresses deferred maintenance.

**replacement:** Substitution or exchange of an existing fixed asset or component with one having essentially the same capacity and purpose.

**custodial:** Replacement of nonfunctional site elements or facilities with in-kind materials or structures. Location, design, and configuration remain constant. Accessibility standards, where possible, are compatible with designated ROS settings.

**decommission:** Demolition, dismantling, removal, obliteration, and/or disposal of a deteriorated or otherwise unneeded asset or component, including necessary cleanup work. This action eliminates the deferred maintenance needs for the fixed asset. Portions of an asset or component may remain if they do not cause problems nor require maintenance.

**fauna:** The vertebrate and invertebrate animals of an area or region.

**fall/winter season:** This period basically begins when all key perennial forage plants have achieved dormancy. It runs through the dormant period and ends just before the initiation of new growth on the key cool season perennial forage species in the spring. In very general terms, this often begins in mid to late October and runs through February, March, or April depending on the elevation, aspect and the weather patterns for a given year.

**Federal trust responsibility:** The Forest Service shares in the federal government's overall trust responsibility to American Indian tribes where treaty or other legally defined rights apply to national forest lands. In redeeming this shared responsibility, the agency assists in carrying out the intent of the treaty and any subsequent case law or amendments, by operating in a just and responsive way; making efforts to adjust the management of national forest lands in favor of the concerns of the respective American Indian tribe(s), as far as practicable, while still maintaining a responsibility to all the people – the general public. These actions and adjustments need to be carried out through consultations with other tribal officials or their designees, on a government-to-government basis.

**federally listed species:** Species that are listed under the Endangered Species Act.

**fine organic matter:** Plant litter, duff, and woody material less than 3 inches in diameter.

**fine-scale:** A single landscape, such as a watershed or subwatershed.

**fire-dependent systems:** Forests, grasslands, and other ecosystems historically composed of species of plants that evolved with and are maintained by fire regimes.

**fire cycle, fire frequency:** Refer to fire return interval.

**low fire intensity:** Soil surface litter and humus have not been destroyed by fire. Root crowns and surface roots will resprout. Potential surface erosion has not changed because of fire.

**moderate fire intensity:** On up to 40 percent of the area, the soil surface litter and humus have been destroyed by fire and the A horizon has had intense heating. Crusting of the soil surface produces accelerated erosion. Intensively burned areas may be water repellent. Root crowns and surface roots of grasses in the intensively burned area are dead and will not resprout.

**high fire intensity:** On 40 percent or more of the area, the soil surface litter and humus have been destroyed by fire and the A horizon has had intense heating. Crusting of the soil surface produces accelerated erosion. Intensively burned areas may be water repellent. Root crowns and surface roots of grasses in the intensively burned area are dead and will not resprout.

**fire intolerant:** Species of plants that do not grow well with, or die from, the effects of too much fire. Generally, these are shade-tolerant species.

**fire management plan:** A plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire, prescribed fire, and wildland fire use). The plan is supplemented by operational plans, including but limited to preparedness plans, preplanned dispatch plans, and prevention plans. Fire management plans assure that wildland fire management goals and components are coordinated.

**fire regime:** The characteristics of fire in a given ecosystem, such as the frequency, predictability, intensity, and seasonality of fire. A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention but including the influence of aboriginal burning (Agee 1993; Brown 1995). Coarse-scale definitions for natural fire regimes were developed by Hardy and others (2001) and Schmidt and others (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five natural fire regimes are classified based on the average number of years between fires (fire frequency or Mean Fire Interval [MFI]) combined with the severity of the fire (the amount of vegetation replacement) and its effect on the dominant overstory vegetation. These five natural fire regimes are as follows:

**fire regime 1:** 0- to 35-year frequency and of low severity (most commonly associated with surface fires) to mixed severity (in which less than 75 percent of the dominant overstory vegetation is replaced).

**fire regime 2:** 0- to 35-year frequency and of high severity (stand replacement: greater than 75 percent of the dominant overstory vegetation is replaced).

**fire regime 3:** 35- to 200-year frequency and of mixed severity.

**fire regime 4:** 35- to 200-year frequency and of high severity.

**fire regime 5:** 200-year-plus frequency and of high severity.

**fire regime condition class (FRCC):** A classification of the degree of departure from the natural fire regime. The fire regime condition class classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure can result in changes (or risks) to one, or more, of the following ecological components: vegetation (species composition, structural stages, stand age, canopy cover, and mosaic pattern across the landscape); fuel composition; fire frequency, severity, and pattern; and other associated disturbances.

**condition class 1:** Fire regimes are within the natural (historical) range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition, structure, and pattern) are intact and functioning within the natural (historical) range.

**condition class 2:** Fire regimes have been moderately altered from their natural (historical) range. Risk of losing key ecosystem components is moderate. Fire frequencies have departed from natural frequencies by one or more return intervals (either increased or decreased). This result in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation and fuel attributes have been moderately altered from their natural (historical) range.

**condition class 3:** Fire regimes have been substantially altered from their natural (historical) range. The risk of losing key ecosystem components is high. Fire frequencies have departed from natural frequencies by multiple return intervals. Dramatic changes occur to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been substantially altered from their natural (historical) range.

**fire return interval:** The average time between fires in a given area.

**fire suppression:** All work and activities connected with fire-extinguishing operation, beginning with discovery and continuing until the fire is completely extinguished.

**fire-tolerant:** Species of plants that can withstand a certain frequency and intensity of fire. Generally, these are shade-intolerant species.

**fish-producing:** Streams, rivers, wetlands, ponds, lakes, and reservoirs that serve as spawning or rearing habitat for fish.

**fledgling:** A young bird that has acquired the feathers necessary for flight.

**floodplain:** The lowland and relatively flat areas joining inland and coastal waters including debris cones and flood-prone areas of off-shore islands, including at a minimum, that area subject to a one percent (100-year recurrence) or greater chance of flooding in any given year (Executive Order 11988, Section 6c); or the area of relatively flat land adjacent to streams that is inundated during times of high flow; or an area formed by the deposition of stream-transported sediment.

**floodplain function:** Collectively, the normal physical and biological processes that are responsible for the formation and maintenance of river floodplains and the biotic communities that inhabit them.

**flow regime:** The range of magnitude, duration, timing and frequency of streamflows characteristic of a given stream.

**food web:** Networks of food chains or feeding relationships by which energy and nutrients are passed from one group of living organisms to another.

**forb:** Broad-leafed, herbaceous, nongrass-like plant species other than true grasses, sedges, and non-woody plants; fleshy leafed plants; having little or no woody material.

**forage:** All browse and herbaceous foods that are available to grazing animals. It may be grazed or harvested for feeding. Refer to rangeland vegetation.

**forested vegetation treatment:** Combination of uneven-aged management methods that may be used to achieve a desired forested structure including single-tree selection, group selection, precommercial thinning, commercial thinning, salvage, and sanitation cutting.

**forest fragmentation:** Refer to fragmentation.

**forest health:** The perceived condition of a forest derived from concerns about such factors as its age, structure, composition, function, vigor, presence of unusual levels of insects and disease and resilience to disturbance. Perception and interpretation of forest health are influenced by individual and cultural viewpoints, land management objectives, spatial and temporal scales, the relative health in stands that comprise the forest, and the appearance of the forest at a point in time.

**forest land:** Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use. Lands developed for non-forest use include areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, and adjoining road clearing and powerline clearing of any width.

**forest roads:** Any road wholly or partly within, or adjacent to, and serving the national forest and which is necessary for the protection, administration, and utilization of the national forests and the use and development of its resources (23 USC 101).

**Forest Service Handbook (FSH):** Directives that provide detailed instructions on how to proceed with a specialized phase of a program or activity.

**Forest Service Manual (FSM):** A system of manuals that provides direction for Forest Service activities.

**forest transportation facility:** A classified road, designated trail, or designated airfield, including bridges, culverts, parking lots, log transfer facilities, safety devices and other transportation network appurtenances under Forest Service jurisdiction that is wholly or partially within or adjacent to National Forest System lands (36 CFR 212.1).

**forest transportation system management:** The planning, inventory, analysis, classification, record keeping, scheduling, construction, reconstruction, maintenance, decommissioning, and

other operations undertaken to achieve environmentally sound, safe, cost-effective access for use, protection, administration, and management of national forest lands.

**fragmentation (habitat):** The break-up of a large continuous land area by reducing and dividing into smaller patches isolated by areas converted to a different land type. Habitat can be fragmented by natural events or development activities.

**fragmentation (forest):** The breakup of a large land forest area into smaller patches isolated by areas converted to a different land type. Opposite of connectivity.

**free-flowing:** A river or stream that exists or flows in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway (16 U.S.C. §1286).

**fuel:** Plants, both living and dead, and woody vegetative materials capable of burning.

**fuel load:** The dry weight of combustible materials per unit area; usually expressed as tons per acre.

**fuel treatment:** Any manipulation or removal of fuels to reduce the likelihood of ignition or to lessen potential damage and resistance to control.

**functioning-at-risk:** Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation (USDA Forest Service 1993).

## G

**geographic information system (GIS):** An information processing technology to input, store, manipulate, analyze, and display data; a system of computer maps with corresponding site-specific information that can be combined electronically to provide reports and maps.

**geologic:** Based on geology which is the study of the structure, processes, and chronology of the earth.

**geological/geomorphic process:** The actions or events that shape and control the distribution of materials, their states, and their morphology, within the interior and on the surface of the earth. Examples of geologic processes include: volcanism, glaciation, streamflow, metamorphism (partial melting of rocks), and landsliding.

**goal:** A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed.

**goods and services:** The various outputs, including on-site uses, produced from forest and rangeland resources.

**government-to-government consultation:** The active and continuous process of contacting tribal leadership, soliciting their participation, involvement, comments, concerns, contributions, and traditional knowledge that will assist the agency in making informed decisions in planning, managing and decision-making actions.

**graminoid:** Grasses and grass-like plants such as sedges and rushes.

**grassland:** Land on which the vegetation is dominated by grasses, grass-like plants, or forbs.

**grazing:** The consumption of standing forage by livestock or wildlife.

**grazing allotment:** Area designated for the use of a certain number and kind of livestock for a prescribed period.

**grazing lands:** Any vegetated land that is grazed or has the potential to be grazed by animals (domestic or wild). This includes rangeland and grazable forestland.

**grazing permit:** Document authorizing livestock to use national forest lands or other lands under Forest Service control for livestock production.

**ground fire:** A fire that burns the organic material in the soil layer and the decayed material or peat below the ground surface.

**groundwater:** All of the water that has percolated through the surface soil into the bedrock.

**Groundwater-dependent ecosystems:** Communities of plants, animals, and other organisms whose extent and life processes are dependent on access to or discharge of groundwater. (USDA Forest Service 2011)

**guideline:** A guideline is a constraint on project and activity decision making that allows for departure from its terms, so long as the intent of the guideline is met. (§ 219.15(d)(3)). Guidelines are established to help achieve a desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

## H

**habitat:** A place that provides seasonal or year-round food, water, shelter, and other environmental conditions for an organism, community, or population of plants or animals.

**harvest:** (1) Felling and removal of trees from the forest; and (2) removal of game animals or fish from a population, typically by hunting or fishing.

**harvestable/harvestability:** With regard to American Indian tribes, refers to a population of plants or animals that is self-sustaining and capable of producing a dependable harvest annually to meet spiritual, cultural, subsistence, and commercial needs.

**head month:** One month's use and occupancy of the range by one animal. For grazing fee purpose, it is a month's use and occupancy of range by one weaned or adult cow with or without calf, bull, steer, heifer, horse, burro, or mule, or five sheep or goats. Refer to animal unit month.

**headwaters:** Beginning of a watershed; the uppermost, unbranched tributaries of a stream.

**healthy ecosystem:** An ecosystem in which structure and functions allow the maintenance of the desired conditions of biological diversity, biotic integrity and ecological processes over time.

**Hells Canyon National Recreation Area (HCNRA) Act:** The Act of December 31, 1975, as amended (PL 94-199, 89 Statute 117), which established the Hells Canyon National Recreation Area.

**herbaceous:** Green and leaf-like in appearance or texture; includes grasses, grass-like plants, and forbs, with little, or no woody component.

**herbicide:** A pesticide used for killing or controlling the growth of plants.

**herbivore:** An animal that subsists on plants or plant materials, either primarily or entirely.

**hiding cover:** Vegetation, primarily trees, capable of hiding 90 percent of a standing adult game animal from the view of a human at a distance equal to or less than 200 feet during all seasons of the year that elk or deer use the area. Generally, any vegetation used for security or to escape from danger.

**high-severity fire:** Refer to fire intensity.

**historical conditions:** Range of historical variation; range of the spatial, structural, compositional and temporal characteristics of ecosystem elements during a period specified to represent natural conditions.

**historic property:** Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register of Historic Places criteria.

**Historic Range of Variability (HRV):** A means to define the boundaries of ecosystem behavior and patterns that have remained relatively consistent over long periods. HRV is usually defined for centuries to millennia before the period of widespread human population increases and associated ecosystem changes that began in roughly the early to middle 1800s for many regions of western North America.

**human-caused disturbance:** Refer to disturbance.

**hydroelectric:** Of or relating to the production of electricity by waterpower.

**hydrologic:** Refers to the properties, distribution, and effects of water. Hydrology refers to the broad science of the waters of the earth, their occurrence, circulation, distribution, chemical and physical properties, and their reaction with the environment.

**hydrologic function:** The behavioral characteristics of a watershed described in terms of ability to sustain favorable conditions of water flow. Favorable conditions of water flow are defined in terms of water quality, quantity, and timing.

**hydrological regimes:** The spatiotemporal dynamics of water flow and associated fluvial process in an ecosystem. Refer to flow regime.

**hydrologic unit:** A hydrologic unit is a drainage area delineated to nest in a multi-level, hierarchical drainage system. Its boundaries are defined by hydrographic and topographic criteria that delineate an area of land upstream from a specific point on a river, stream or similar surface waters. A hydrologic unit can accept surface water directly from upstream drainage areas, and indirectly from associated surface areas such as remnant, noncontributing, and diversions to form a drainage area with single or multiple outlet points.

**hydrologic unit code (HUC):** A hierarchical coding system developed by the U.S. Geological Survey to identify geographic boundaries of watersheds of various sizes (12).

**4<sup>th</sup>-code HUC** refers a subbasin generally about 450,000 acres in size.

**5<sup>th</sup>-code HUC** refers to a watershed. These areas generally range from 40,000 to 250,000 acres in size.

**6<sup>th</sup>-code HUC** refers to a subwatershed HU that generally ranges from 10,000 to 40,000 acres in size.

**Individual Clumps and Openings (ICO)** - this approach uses historical information at the stand- and landscape-level to design restoration strategies and prescriptions for restoration (e.g., see (Franklin et al. 2013b)). For example, the pattern of old trees, stumps and snags currently on the landscape provide indicators of natural tree clumping and spacing, and thus the degree of horizontal spatial heterogeneity. In places where legacies of historic forest patterns are absent (e.g., young, post-fire forests), information is used from similar habitats.

**impacts:** Refer to effects.

**implement:** To carry out.

**indicator species:** Refer to management indicator species.

**indirect effects:** Impacts on the environments that are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable.

**infestation:** The attack or invasion by parasites or pests.

**infiltration:** The process by which water seeps into the soil, influenced by soil texture, aspect, and vegetation cover.

**infrastructure:** The basic facilities, equipment, and installation needed for the functioning of a system; commonly refers to items such as roads, bridges, power facilities, and the like.

**insecticide:** A pesticide employed against insects.

**instream flow:** Flow of water in its natural setting (as opposed to waters diverted for off-stream uses such as industry or agriculture). Instream flow levels provided for environmental reasons enhance or maintain the habitat for riparian and aquatic life, with timing and quantities of flow characteristic of the natural setting.

**integration:** Bringing the values and systems of different disciplines together to address questions with a common framework using consistent techniques and measurement units.

**interagency:** Involving the Forest Service, Bureau of Land Management, Fish and Wildlife Service, National Marine Fisheries Service, Environmental Protection Agency, and/or other Federal agencies.

**interdisciplinary team (IDT):** A group of specialists assembled as a cohesive team with frequent interactions to solve a problem or perform a task.

**intermittent stream:** A stream in which the flow of water on the surface is discontinuous, or that alternates between zones of surface and sub-surface flow.

**invasion (plant):** The movement of a plant species into a new area outside its former range.

**invasive nonnative species:** Are those animal and plant species with an extraordinary capacity for multiplication and spread at the expense of other native species. Plants in this category may or may not be designated as noxious weeds.

**invasive plant species:** Nonnative plant species that invade or are introduced into an environment or ecosystem in which they did not evolve where they have the ability to compete with, and at times overshadow, the existing native plant species. Invasive species are also likely to cause economic or environmental harm or harm to human health. Invasive species include seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (with respect to a particular ecosystem). Noxious weeds are a specific type of invasive plants that carry a legal designation due to their potential for detrimental impacts to the environment.

**Inventoried roadless areas (IRAs):** Those areas identified in the Land Management Plan and listed on a set of inventoried roadless area maps, contained in Forest Service Roadless Area Conservation, Final Environmental Impact Statement, Volume 2, (USDA Forest Service 2000), which are held at the Washington Office of the Forest Service, or any update, correction, or revision of those maps through the land management planning process.

**invertebrate:** Small animals that lack a backbone or spinal column. Spiders, insects, and worms are examples of invertebrates.

**irretrievable commitment:** Applies to losses of production or commitment of renewable natural resources. For example, while an area is used as a ski area, some or all of the timber production there is “irretrievably” lost. If the ski area closes, timber production could resume; therefore, the loss of timber production during the time the area is devoted to skiing is irretrievable but not irreversible, because it is possible for timber production to resume if the area is no longer used as a ski area.

**irreversible commitment:** Applies to nonrenewable resources, such as minerals and archaeological sites. Losses of these resources cannot be reversed. Irreversible effects can also refer to effects of actions on resources that can be renewed only after a very long period, such as the loss of soil productivity.

**issue:** A point, matter of controversy, dispute, question of public discussion, or general concern over resource management activities or land uses to be addressed or decided through the planning process. To be considered a significant environmental impact statement issue, it must be well defined, relevant to the proposed action, and within the ability of the agency to address through alternative management strategies.

## K

**keystone species:** A species whose presence and role within an ecosystem has a disproportionate on other organisms within the system.

## L

**ladder fuels:** Vegetation located below the crown level of forest trees, which can carry fire from the forest floor to tree crowns. Ladder fuels may be low growing tree branches, shrubs, or smaller trees. Fire can move from surface fuels by convection into the crowns with relative ease.

**landform:** One of the attributes or features that make up the Earth's surface such as a plain, mountain, or valley, as defined by its particular combination of bedrock and soils, erosion processes, and climatic influences.

**land and resource management plan (LRMP) or land management plan:** A document that provides broad strategic guidance and information for project and activity decision making in a national forest through plan components (desired conditions, suitable uses, guidelines, special areas, and objectives), as required by the National Forest Management Act and the Planning Rule.

**landscape:** All the natural features such as grasslands, hills, forest, and water, which distinguish one part of the earth's surface from another part; usually that portion of land which the eye can comprehend in a single view, including all its natural characteristics.

**landscape character:** Identifiable image made by particular attributes, qualities, and traits of a landscape.

**landscape ecology:** The study of ecological effects to spatial patterns in ecosystems.

**landscape-level/landscape-scale:** Refer to broad-scale.

**landscape pattern:** Number, frequency, size and juxtaposition of landscape elements (stands and patches) that are important to the determination or interpretation of ecological processes.

**landscape structure:** The mix and distribution of stand or patch sizes across a given area of land. Patch sizes, shapes, and distributions are a reflection of the major disturbance regimes operating on the landscape.

**land-use allocation:** The commitment of a given area of land or a resource to one or more specific uses--for example, to campgrounds or wilderness.

**late/old structure:** Forest stands whose structural development incorporates the elements of the late and the old structural stages. The understory species can be found in all canopy layers. Overstory vigor begins to decline, as does tolerance to native pathogens and insects. In the late stage, the understory has become the dominant cover and the overstory is beginning to decline and collapse. In the old stage, stands in which all of the relic (pioneering) trees have died and which consist entirely of trees that grew from beneath. These structural stages may or may not contain the various characteristics sometimes identified with old growth structure.

**late seral:** Refer to seral stages.

**late spring season:** Late spring is defined as that period when the key perennial cool season forage plant growth is still occurring but soil moisture is beginning to limit growth. Livestock removal is not planned to occur during the time when assurance can be made that essentially full regrowth would occur.

**late successional:** The stage of ecological succession and type of vegetation that develops after a long period of time following a stand-replacing disturbance.

**legacy tree:** Trees that have been spared or have survived stand replacing disturbances (Mazurek and Zielinski, 2004). A legacy tree is any live tree greater than or equal to 21 inches d.b.h. and greater than 150 years old, located in a non-old forest stand.

**lethal (stand-replacing) fires:** Fires that result in stand replacement of the existing forested vegetation. Mortality levels are very high at all canopy levels within the stand. In forests, fires in which less than 20 percent of the basal area or less than 10 percent of the canopy cover remains; in rangelands, fires in which most of the shrub overstory or encroaching trees are killed.

**lichens:** Organisms made up of specific algae and fungi, forming identifiable crusts on soil, rocks, tree bark, and other surfaces. Lichens are primary producers in ecosystems; they contribute living material and nutrients, enrich the soil and increase soil moisture-holding capacity, and serve as food sources for certain animals. Lichens are slow growing and sensitive to chemical and physical disturbances.

**litter:** The uppermost layer of organic debris on the soil surface, which is essentially the freshly fallen or slightly decomposed vegetation material such as stems, leaves, twigs, and fruits.

**local population:** A group of individuals that spawn or breed in a particular area; the smallest group of individuals that is known to represent an interacting reproductive unit.

**loess:** Fine grained wind-deposited material predominantly of silt-size particles.

**long term:** Generally refers to a period longer than 10 years up to 100 years.

**lower montane:** A terrestrial community that generally is found in drier and warmer environments than the montane terrestrial community. The lower montane community supports a unique clustering of wildlife species.

## M

**mainstem:** The main channel of the river in a river basin, as opposed to the streams and smaller rivers that feed into it.

**maintain:** To continue; or keep ecosystem functions, processes, and/or components (such as soil, air, water, vegetation) in such a condition that the ecosystem's ability to accomplish current and future management objectives is not weakened. Management activities may be compatible with ecosystem maintenance if actions are designed to maintain or improve current ecosystem condition.

**major population group:** A group of either salmon populations or group of steelhead populations that are geographically and genetically cohesive. The major population group is a level of organization between demographically independent populations and evolutionarily significant units or distinct population segments.

**management area:** An area with similar management objectives and a common management prescription, as prescribed by the land management plan.

**management concern:** An issue, problem, or a condition which constrains the range of management practices identified by the Forest Service in the planning process.

**management direction:** A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.

**management indicator species (MIS):** In the original forest plans, a species selected because its welfare is presumed to be an indicator of the welfare of other species using the same habitat. A species whose condition can be used to assess the impacts of management actions on a particular area.

**management intensity:** A management practice or combination of management practices and associated costs designed to obtain different levels of goods and services.

**management practice:** A specific activity, measure, course of action, or treatment.

**management prescription:** Management practices and intensity selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives.

**mechanical equipment:** Any contrivance which travels over ground, snow, or water on wheels, tracks, skids, or by flotation that is powered by a living source. This term does not include nonmotorized river craft, wheelchairs, or other similar devices used solely to assist persons with disabilities.

**mechanical fuel treatment:** Treatment of fuels using mechanical means, such as thinning by chainsaw, crushing down wood, or piling down wood.

**mechanized:** Wheeled forms of transportation (including nonmotorized carts, wheelbarrows, bicycles and any other nonmotorized, wheeled vehicle.

**mesic:** Pertaining to conditions of moderate moisture or water supply; used of organisms occupying moist habitats.

**metapopulations:** A group of conspecific populations coexisting in time but not space.

**microclimate:** The climatic conditions within a small habitat such as: a tree stump, under a boulder, in the space between grasses, or on the side of a slope.

**migration corridor:** The habitat pathway an animal uses to move from one place to another.

**minerals-locatable:** Those hardrock minerals that are mined and processed for the recovery of metals. They also may include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica.

**minerals-leasable:** Coal, oil, gas, phosphate, sodium, potassium, oil shale, sulphur, and geothermal resources.

**minerals-materials (salable):** A collective term to describe common varieties of sand, gravel, stone, pumice, pumicite, cinders, clay, and other similar materials. Common varieties do not include deposits of those materials that may be locatable.

**mining:** Any activity related to the discovery, extraction, and exploration of minerals under the Mining Act of 1872 and the Mineral Leasing Act of 1920 through the use of, among other things, hydraulic equipment, pans, ground sluicing, sluice boxes, rockers, or suction dredges.

**mining claim:** A particular parcel of public land, valuable for a specific mineral deposit or deposits, for which an individual has asserted a right of possession. The right is for developing and extracting a discovered mineral deposit.

**mining lands:** Lands primarily used for mining purposes as of June 13, 1994 and which are assigned to the mining land category in 36 CFR 292.22 of the private land use regulations.

**mitigation:** Measures designed and implemented to counteract environmental impacts or to make impacts less severe.

**mixed-severity fire:** These fire regimes will have the greatest toll on thinner barked and/or young age classes within the stand. Low intensity fires within the stand will favor overstory fire-resistant species (ponderosa pine, western larch, and Douglas fir). Crown fire potential does exist depending on stand structures and age classes of different stand cohorts of any available ladder fuels. If it occurs, the result will favor the return to grass and forbs.

**moist forest:** Area between drier, low elevation forests and higher elevation, cold forests.

**mollisol** - a soil order in USDA soil taxonomy. Mollisols have deep, high organic matter, nutrient-enriched surface soil (A horizon), typically between 60–80 cm in depth. This fertile surface horizon, known as a mollic epipedon, is the defining diagnostic feature of Mollisols. Mollic epipedons result from the long-term addition of organic materials derived from plant roots, and typically have soft, granular, soil structure. These environments have historically been strongly influenced by fire and organisms such as ants and earth worms.

**monitoring:** A process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized. Monitoring allows detection of undesirable and desirable changes so that management actions can be modified or designed to achieve desired goals and objectives while avoiding adverse effects to ecosystems.

**monitoring program:** Prioritized criteria, indicators, and measures that are the means of measuring progress toward the desired conditions when conducting the annual and comprehensive evaluations.

**montane:** A terrestrial community that generally is found in moderate (ponderosa pine) and subalpine terrestrial communities. Montane communities are generally moister than lower montane and warmer than subalpine communities, and support a unique clustering of wildlife species.

**mosaic:** A pattern of vegetation in which two or more kinds of communities are interspersed in patches, such as clumps of shrubs with grassland between.

**motorized equipment:** Any machine powered by a nonliving source. This term does not include motorized river craft or small hand-held devices such as flashlights, shavers, wristwatches, and Geiger counters.

**multi-story:** More than one canopy layer.

**multiple-use management:** The management philosophy articulated by the Multiple Use Sustained Yield Act of 1960. This law provides that the renewable resources of the national forests are to be managed in the combination that best meets the needs of the American people. It further stipulates that the Forest Service is to make judicious use of the land for some or all of these resources and related services over areas large enough to ensure that sufficient latitude exists to subsequently adjust management in conformity with changing needs and conditions.

**municipal watersheds (public supply watersheds):** A watershed that serves a public water system as defined in Public Law 93-523 (Safe Drinking Water Act) or as defined in state safe drinking water regulations. The definition does not include communities served by a well or confined groundwater unaffected by Forest Service activities.

**mycorrhizae:** The symbiotic relationship between certain fungi and the roots of certain plants, especially trees; important for plants to take nutrients from soil.

## N

**National Ambient Air Quality Standards (NAAQSs):** Standards set by the Federal Environmental Protection Agency for the maximum levels of air pollutants that can exist in the outdoor air without unacceptable effects on human health or the public welfare.

**National Environmental Policy Act (NEPA):** An act to declare a national policy which will encourage productive and enjoyable harmony between humankind and the environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality.

**National Forest Management Act (NFMA):** A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring the preparation of forest plans and the preparation of regulations to guide that development.

**National Forest System (NFS):** All national forest lands reserved or withdrawn from the public domain of the United States; all national forest lands acquired through purchase, exchange, donation, or other means; the National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010-1012); and other lands, waters, or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system.

**National Forest System road:** A classified forest road under the jurisdiction of the Forest Service. The term National Forest System roads is synonymous with the term forest development roads as used in 23 USC 205. Generally referred to as a Forest Road (FR).

**National Recreation Trail:** Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National recreation trails provide a variety of outdoor recreation uses.

**National Register of Historic Places:** A listing (maintained by the U.S. National Park Service) of areas that have been designated as being of historical significance. The Register includes places of local and state significance as well as those of value to the Nation.

**National Wild and Scenic River System:** Includes rivers with outstanding scenic, recreational, geological, fish and wildlife, historic, cultural or other similar values designated by Congress under the Wild and Scenic Rivers Act for preservation of their free-flowing condition. Refer to Wild and Scenic River.

**native species:** Species that normally live and thrive in a particular ecosystem. Animals or plants that have historically occupied a given aquatic or terrestrial area.

**natural disturbance:** Periodic impact of natural events such as: fire, severe drought, insect or disease attack, or wind.

**near natural rates of recovery:** Rates not exceeding condition thresholds and meeting standards for forage and browse utilization.

**neotropical:** Those species of birds that nest in the United States or Canada and winter regularly in the Neotropics (south of the Tropic of Cancer and Capricorn) in Mexico, the Caribbean Islands, or Central or South America. 2).

**net public benefits:** An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

**niche:** A place or activity for which a thing is best fitted.

**no-action alternative:** The most likely condition expected to exist in the future if current management direction were to continue unchanged.

**nonfunctional:** Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and not reducing erosion or improving water quality. The absence of certain physical attributes, such as a floodplain where one should be, is an indicator of nonfunctioning conditions (Process for Assessing Proper Functioning Condition, USDI BLM 1993).

**nongame species:** Those species of animals that are not managed as a sport hunting resource.

**nonlethal fire:** Fires that consist of low intensity under burns with limited single tree or group torching. Fire related mortality to the dominant-fire resistant species is slow, but occurs because of this type of localized fire behavior. In forests, fires in which more than 70 percent of the basal area or more than 90 percent of the canopy cover survives; in rangelands, fires in which more than 90 percent of the vegetative cover survives (implies that fire is occurring in an herbaceous-dominated community).

**nonnative invasive species (NNIS):** Plant species that are introduced into an area in which they did not evolve and in which they usually have few or no natural enemies to limit their reproduction and spread. These species can cause environmental harm by significantly changing ecosystem composition, structure, or processes and can cause economic harm or harm to human health.

**nonpoint source pollution:** Pollution whose source is general rather than specific in location; the sources of the pollutant discharge are dispersed, not well defined or constant. Examples include sediments from logging activities and runoff from agricultural chemicals. It is widely used in reference to agricultural and related pollutants, such as production of sediments by logging operations, agricultural pesticide applications, or automobile exhaust pollution.

**nontreaty bands:** The five bands of Nez Perce whose traditional homes lay outside the reduced reservation boundaries described in the Treaty of 1863.

**noxious weeds:** Plants designated as noxious weeds by the Secretary of Agriculture or by the responsible state official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being native or new to or not common to the United States or parts thereof. A noxious weed is one that causes disease or has other adverse effects on the human environment and therefore is detrimental to the agriculture and commerce of the United States and to the public health.

**nutrient cycling:** Ecological processes in which nutrients and elements such as carbon, phosphorous, nitrogen, calcium, and others, circulate among animals, plants, soils, and air.

## O

**objective:** A concise, time-specific statement that describes the incremental progress expected to take place to meet goals (desired conditions) over the planning period with respect to estimated quantities of services and accomplishments. Objectives are projections of outcomes based on certain social, economic, and ecological indicators that measure the plans performance and identify specific opportunities and possible future proposals in terms of ongoing programs and future projects to support the goals for the planning area.

**off-channel:** Aquatic habitats separated from the main stream or river, such as side-channels, oxbows, ponds, or sloughs, which may or may not be directly connected to a river or stream.

**off-highway vehicle (OHV):** Any motor vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain.

**old forest:** Old forests are ecosystems distinguished by old trees and related structural attributes. Old forest encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function.

**old forest multistory (OFMS):** This structure class includes multiple age classes and vegetation layers, along with large, old trees. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. Overstory diameters are generally greater than 20 inches.

**old forest single story (OFSS):** This structure class can include multiple age classes, but generally only includes one main overstory strata. Large, old trees are common. Decaying fallen trees may also be present that leave a discontinuous overstory canopy. Overstory diameters are generally greater than 20 inches.

**ongoing actions:** Those actions that have been implemented, or have contracts awarded or permits issued. Refer to new actions.

**openings:** Refers to meadows, clearcuts, and other areas of vegetation that do not provide hiding or thermal cover.

**outcome:** The long-term results of a program activity compared to its intended purpose (Government Performance and Results Act of 1993 (5 U.S.C. 306)). Outcome is a state of being similar to long-term ecological, social, or economic condition or goal (such as the maintenance of an ecosystem's biodiversity, jobs and income, or the quality of a regions' surface water as measured by indicators).

**outdoor recreation activities:** Activities such as camping, picnicking, rafting, boating, hiking, rock climbing, fishing, hunting, horseback riding, and the viewing of wildlife or scenery.

**outfitting:** Providing through rental or livery any saddle or pack animal, vehicle or boat, tents or camping gear, or similar supplies or equipment, for pecuniary remuneration or other gain. The term guide includes the holder's employees, agents, and instructors. Pecuniary remuneration means monetary reward (Washington Office Amendment 2709.11-95-11, 41-53C).

**outputs:** A broad term for describing any result, product, service or concern that a system produces by its activities. They are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. The unit of measure should indicate or serve as a proxy for what the recipients get rather than what the agency does in the process of producing the given output. Example: timber sold, recreation use, livestock grazing use, etc. Any good, service, or on-site use that is produced from rural resources.

**outslope:** Roads that are sloped towards the downhill side of the roadway to better match the natural drainage patterns and minimize the potential for diversion.

**outstandingly remarkable values (ORVs):** Term used in the Wild and Scenic Rivers Act of 1968; to qualify as outstandingly remarkable, a resource value must be a unique, rare, or exemplary feature that is significant at a regional or national level.

**overgrazing:** Consumption of rangeland grass by grazing animals to the point that it cannot be renewed, or can be only slowly renewed, because of damage to the root system.

**overstory:** Portion of the trees, in a forest or in a forested stand of more than one story, forming the upper or uppermost canopy.

**overwinter:** To keep livestock or plants alive through the winter by sheltering them, or to be kept alive in this way.

## **P**

**PACFISH:** Regional Forester's Amendment 3, Interim strategies for managing anadromous fish-producing watersheds in Eastern Oregon and Washington, Idaho, and portions of California (USDA and USDI 1995).

**paleontological sites:** Areas that contain any remains, trace, or imprint of a plant or animal that has been preserved in the earth's crust before the Holocene epoch.

**parcel:** Contiguous tax lots under one ownership. For the purposes of the Private LURs, rights-of-way do not divide parcels into smaller units.

**particulate emissions:** Solid particles or liquid droplets that can be suspended or carried in the air, or released as air contaminants into the outdoor atmosphere.

**PM<sub>10</sub>** – Particulate matter that measures 10 micrometers in diameter or less, a size considered small enough to invade the alveolar regions of the lung. PM<sub>10</sub> is one of the six pollutants for which there are National Ambient Air Quality Standards.

**PM<sub>2.5</sub>** – Particulate matter that measures 2.5 micrometers in diameter or less.

**passive management:** Allowing nature to restore (heal) the natural balance between erosion/deposition, hydrologic, and vegetation processes by removing identified adversely affecting agents.

**patch:** An area of vegetation that is relatively homogeneous internally and differs from surrounding elements.

**pathogen:** An agent such as a fungus, virus, or bacterium that causes disease.

**pattern:** The spatial arrangement of landscape elements (patches, corridors, matrix) that determines the function of a landscape as an ecological system.

**pesticide:** A chemical preparation used to control individuals or populations of injurious organisms.

**permittee (livestock):** Any entity that has been issued a grazing permit.

**phases:** Plant communities or seral stages within a steady state connected to each other by community pathways.

**plan amendment:** The process for making substantive changes to a land management plan for the desired conditions, suitable uses, special areas, objectives and guidelines.

**planning area:** The area of the National Forest System covered by a regional guide or forest plan.

**planning horizon:** The overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions.

**planning record:** A written record of the land management plan revision process containing detailed information and analysis used support conclusions and decisions made in the plan.

**plant associations:** A plant community type based on the land management potential, successional patterns and species composition.

**plant communities:** Any grouping of plants that have some structural similarity (Johnson and Simon 1987).

**plateau:** Any comparatively flat area of great extent and elevation; specifically an extensive land region considerably more elevated above the adjacent country; it is commonly limited on at least one side by an abrupt descent.

**point source pollution:** Pollution that comes from a single identifiable source such as a smokestack, a sewer, or a pipe.

**pool:** Portion of a stream where the current is slow, often with deeper water than surrounding areas and with a smooth surface texture. Often occur above and below riffles and generally are formed around stream bends or obstructions such as logs, root, wads, or boulders. Pools provide important feeding and resting areas for fish.

**potential natural community (PNC):** The biotic community that would become established if all successional sequences were completed without interference by humans under present environmental conditions. Natural disturbances are inherent in development.

**potential vegetation group (PVG):** A group of potential vegetation types grouped on the basis of similar general moisture or temperature environment and similar types of life forms.

**potential vegetation types (PVT):** A kind of physical and biological environment that produces a kind of vegetation; the species that might grow on a specific site in the absence of disturbance; can also refer to vegetation that would grow on a site in the presence of frequent disturbance that is an integral part of the ecosystem and its evolution.

**precommercial thinning:** The removal of trees not for immediate financial return but to reduce stocking to concentrate growth on the more desirable trees.

**prehistoric site:** An area that contains important evidence and remains of the life and activities of early societies that did not record their history.

**prescribed fire:** Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met, prior to ignition.

**prescription:** A management pathway to achieve a desired objective(s).

**present net value (PNV):** The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

**primitive recreation:** Those types of recreation activities associated with unroaded land, for example: hiking, backpacking, and cross-country travel.

**private land:** Land not in federal, state, or local government ownership.

**productive capacity:** The growth and accumulation of plant biomass (primary productivity) as well as the growth of animal species that use the products (secondary productivity). Key elements of productivity include the physical, chemical, and biological properties of soils which provide for vegetative growth and the accumulation and cycling of nutrients.

**productivity:** Productivity is based on using natural resources no faster than they are produced or can be replaced and using natural resources without impairment of the long-term productive capacity of the ecosystem from which they are derived.

**programmatic agreement (PA):** This is a historic preservation document that records the terms and conditions agreed upon to resolve the potential adverse effects of a Federal agency program,

complex undertaking or other situations in accordance with the Section 106 review under NHPA [36CFR800.14(b)].

**proper functioning condition (PFC):** Riparian and wetland areas achieve proper functioning condition when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows. This thereby reduces erosion and improves water quality; filters sediment, captures bedload, and aids floodplain development; improve flood–water retention and ground water recharge; develops root masses that stabilize stream banks against cutting action; develops diverse ponding and channel characteristics to provide the habitat and water depths, duration, and temperature necessary for aquatic vertebrate and invertebrate production, waterfowl breeding, and other issues; and supports greater biodiversity. The functioning condition of riparian and wetland areas is a result of the interaction among geology, soil, water and vegetation.

**project:** An organized effort to achieve an objective identified by location, timing, activities, outputs, effects, and time period and responsibilities for executions.

**project-level:** Site-specific analysis and planning processes for a specific project or set of projects usually on an individual ranger district.

**proposed action:** A proposal by a federal agency to authorize, recommend, or implement a management action.

**public issue:** A subject or question of widespread public interest relating to management of the National Forest System.

**public roads:** Any road or street under the jurisdiction of and maintained by a public authority and open to public travel (23 U.S.C. §101(a)).

## Q

**qualitative:** Traits or characteristics that relate to quality and cannot be measured with numbers.

**quality of life:** Refers to the satisfaction people feel for the places where they live (or may visit) and for the places they occupy as part of that experience.

**quantitative:** Traits or characteristics that can be measured with numbers.

## R

**range forage condition:** The current composition or productivity of rangeland relative to what that rangeland is capable of producing as a potential natural community, and often synonymous with forage condition.

**range analysis:** The systematic interpretation, analysis, and evaluation of data for rangeland resource management planning. It provides ecological and other information for overall forestland and resource management planning and allotment management planning.

**rangeland (range):** Lands where the vegetation is predominately grasses, grass-like plants, forbs, or shrubs. Rangelands include natural grasslands, shrublands, savannahs, tundra, most

deserts, and riparian and wetland plant communities, including marshes and wet meadows, with greater than about 200 pounds of forage production per year per acre.

**rangeland resources:** The physical and biotic resources of rangeland ecosystems.

**rangeland resource inventory:** The systematic acquisition of inventory data that characterizes the vegetation, soil, and other rangeland resources.

**rangeland vegetation:** Vegetation on all land with rangeland resource objectives or rangeland resource values, including riparian areas. Generally, the focus is on land supporting grass or grass-like plants, forbs, or shrubs during one or more ecological stages. Forested and nonforested sites providing forage and habitat for wild and domestic animal species are included.

**rare plants:** Plants that are federally listed as threatened, endangered, or proposed for federal listing; Forest Service Sensitive for Regions 1, 4, and 6, or disjunct species. This includes plants considered rare both globally (G1, G2, G3) or within states (S1, S2 or S3). Refer to the analysis files for a complete description.

**rearing habitat:** Area in rivers or streams where juvenile salmon and trout find food and shelter to live and grow.

**recontour:** To move soil back (usually with mechanical or hand tools) to a previous condition thus making an area blend with the natural landscape.

**record of decision (ROD):** An official document separate from, but associated, with a final environmental impact statement in which a deciding official identifies all alternatives, and specifies which were environmentally preferable, states the decision, and states whether all practicable means to avoid environmental harm from the alternative have been adopted, and if not, why not (40 CFR 1505.2).

**recovery plans:** A plan for the survival and conservation of species listed under the Endangered Species Act. The Act [Section 4(f)] requires that recovery plans contain: 1) objectives, measurable goals for delisting; 2) a comprehensive list of the actions necessary to achieve the delisting goals; and 3) an estimate of the cost and time required to carry out those actions. In addition, NOAA Recovery Planning Guidelines suggest that recovery plans include an assessment of the factors that led to population declines and/or which are impeding recovery. Finally, it is important that the plans include a comprehensive monitoring and evaluation program for gauging the effectiveness of recovery measures and overall progress toward recovery (USDI 1988).

**recreation:** Leisure time activity such as swimming, picnicking, boating, hunting, and fishing.

**developed recreation:** Recreation that requires facilities that, in turn, result in concentrated use of an area. Examples of developed recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings.

**dispersed recreation:** A general term referring to recreation use outside developed recreation sites; this includes activities such as scenic driving, hiking, backpacking, hunting, fishing, snowmobiling, horseback riding, cross-country skiing, and recreation in primitive environments.

**recreation opportunity:** The availability of choices for users to participate in the recreational activities they prefer within the settings they prefer.

**recreation opportunity spectrum (ROS):** A recreation opportunity setting is the combination of physical, biological, social, and managerial conditions that give value to a place. Thus, an opportunity includes qualities provided by-nature (vegetation; landscape, topography, scenery), qualities associated with recreational use (levels and types of use), and conditions provided by management (developments, roads, regulations). By combining variations of these qualities and conditions, management can provide a variety of opportunities for recreationists. The settings, activities, and opportunities for obtaining experiences have been arranged along a continuum or spectrum divided into six classes: primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and urban (40 CFR 1505.2).

**primitive** - Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.

**semiprimitive nonmotorized** – Area is characterized by a predominantly natural or natural appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.

**semiprimitive motorized** – Area is characterized by a predominantly natural or natural appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motor bikes is permitted.

**roaded natural** -Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities

**rural** -Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities is designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.

**urban** - Area is characterized by a substantially urbanized environment, although the background may have natural appearing elements. Resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, are predominant. Large

numbers of users can be expected, both on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

**recreation residences:** Privately owned recreation cabins authorized by special use permit on National Forest System land that occupy planned, approved tracts or those groups of tracts established for recreation residence use.

**recreation site:** Specific places in the forest other than roads and trails that are used for recreational activities. These sites include a wide range of recreational activities and associated development. These sites include highly developed facilities like ski areas, resorts, and campgrounds. It also includes dispersed recreation sites that have few or no improvements but show the effects of repeated recreation use.

**recreation visit:** An entry of one person to a recreation site or area of land or water for the purpose of participating in one or more recreation activities for an unspecified period.

**recreational facilities:** Refers to facilities associated with or required for outdoor recreational activities and includes, but are not limited to, parks, campgrounds, hunting and fishing lodges, and interpretive displays.

**recreational river:** Refer to Wild And Scenic River.

**redd:** Nest in gravel of stream bottom where a fish deposits eggs.

**reforestation:** Treatments or activities that help to regenerate stands of trees after disturbances such as timber harvest or wildfire. Typically, reforestation activities include preparing soil, controlling pests, and planting seeds or seedlings.

**refugia:** Areas that have not been exposed to great environmental changes and disturbances undergone by the region as a whole; refugia provide conditions suitable for survival of species that may be declining elsewhere.

**regeneration:** The process of establishing new plant seedlings, whether by natural means or artificial measures (planting).

**regeneration harvest:** A timber harvest by which a new age class is created by using clearcutting, seed tree, shelterwood, or selection methods.

**regulations:** Generally refers to the CFR, Title 36, chapter II, which covers management of the Forest Service.

**rehabilitate:** To repair and protect certain aspects of a system so that essential structures and functions are recovered, even though the overall system may not be exactly as it was before.

**relic:** Persistent remnants of formerly widespread fauna or flora species existing in certain isolated areas or habitats. The existence of an organism or species in an otherwise extinct taxon (phylum, order, family, genus, or species) from an earlier time that has survived in an environment that has undergone considerable change.

**renewable energy:** Energy derived from natural sources, such as sunlight, wind, rain, tides, or geothermal resources, that does not consume the resource when used.

**research natural area (RNA):** An area set aside by a public or private agency specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes. In Forest Service usage, Research Natural Areas are areas designated to ensure representative samples of as many of the major naturally-occurring plant communities as possible.

**resident fish:** Fish that spend their entire life in freshwater; examples include redband trout and bull trout a.

**resource:** Anything which is beneficial or useful, be it animal, vegetable, mineral, a location, a labor force, a view, an experience, etc. Resources, in the context of land use planning, thus vary from such commodities as timber and minerals to such amenities as scenery, scenic viewpoints, or recreation opportunities.

**responsible official:** The Forest Service employee who has the authority to select and/or carry out a specific planning action.

**restoration:** Restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. It is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity, and sustainability. Restoration is an attempt to return an ecosystem to its historic trajectory, but not necessarily to a former state.

**resource allocation:** The action of apportioning the supply of a resource to specific uses or to particular persons or organizations.

**riparian area:** An area with distinctive soils and vegetation between a stream, or other body of water, and the adjacent upland area consisting of vegetation that requires free, or unbound, water for survival.

**riparian-dependent species:** Plant species that rely on free or unbound water for establishment and survival, and animal species that would normally occupy, or rely on, riparian habitats.

**riparian habitat conservation areas (RHCAs):** Portions of watershed where riparian-dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. Riparian habitat conservation areas include traditional riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological functioning is crucial to maintenance of the streams' water, sediment, woody debris, and nutrient delivery system.

**fish-bearing streams:** Riparian habitat conservation areas consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of two site-potential trees, or 300 feet slope distance (600 feet total, including both sides of the stream channel), whichever is greatest. In degraded or incised streams, the riparian management area should extend from the edge of the active channel to the outer extent of the former floodplain.

**permanently flowing non-fish-bearing streams:** Riparian habitat conservation areas consist of the stream and the area on each side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or to the outer edges of the 100-year floodplain, or to the outer edges of riparian vegetation, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance (300 feet total, including both sides of the

stream channel), whichever is greatest. In degraded or incised streams, the riparian management area should extend from the water's edge to the outer extent of the former floodplain.

**ponds, lakes, reservoirs, and wetlands greater than 1 acre:** Riparian habitat conservation areas consist of the body of water or wetland and: the area to the outer edges of the riparian vegetation, or to the extent of seasonally saturated soil, or the extent of unstable and potentially unstable areas, or to a distance equal to the height of one site-potential tree, or 150 feet slope distance from the edge of the wetland greater than 1 acre or the maximum pool elevation of constructed ponds and reservoirs, whichever is greatest.

**seasonally flowing or intermittent streams, wetlands, seeps and springs less than 1 acre, and landslide and landslide prone areas:** This category applies to features with high variability in size and site-specific characteristics. At a minimum, the riparian habitat conservation areas should include:

- ◆ The extent of unstable and potentially unstable areas (including earthflows).
- ◆ The stream channel and extend to the top of the inner gorge, or in incised streams, to the edge of the former floodplain.
- ◆ The stream channel or wetland and the area from the edges of the stream channel or wetland to the outer edges of the riparian vegetation, extending from the edges of the stream channel to a distance equal to the height of one site-potential tree, or 100 feet slope distance, whichever is greatest. A site-potential tree height is the average maximum height of the tallest dominant trees for a given site class.
- ◆ Intermittent streams are defined as any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two physical criteria.. Accurate identification of these features is critical to the correct implementation of the strategy and protection of the intermittent stream and wetland functions and processes. Identification of these features is difficult at times due to the lack of surface water or wet soils during dry periods. Fish-bearing intermittent streams are distinguished from non-fish-bearing intermittent streams by the presence of any species of fish for any duration. Many intermittent streams may be used as spawning and rearing streams, refuge areas during flood events in larger rivers and streams or travel routes for fish emigrating from lakes. In these instances, the guidelines for fish-bearing streams would apply to those sections of the intermittent stream used by the fish.

**riverine:** On or near the banks of a river; riparian.

**road:** A motor vehicle route over 50 inches wide, unless designated and managed as a trail. A road may be classified, unclassified, or temporary (36 CFR 212.1).

**classified roads:** Roads wholly or partially within or adjacent to national forest lands that are determined to be needed for long-term motor vehicle access, including state roads, county roads, privately owned roads, forest roads, and other roads authorized by the Forest Service (36 CFR 212.1).

**closed road:** A road with all use suspended year-long by an active form of facility management utilizing regulations and appropriate enforcement to secure and ensure user compliance with closure.

**open road:** A road that has no use restrictions or regulations imposed and is available for use by vehicles at any time during the year.

**temporary roads:** Roads authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be a part of the forest transportation system and not necessary for long-term resource management (36 CFR 212.1).

**unclassified roads:** Roads on national forest lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travel ways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1).

**road construction:** Activity that results in the addition of forest classified or temporary road miles (36 CFR 212.1). New construction activities may include vegetation clearing and grubbing, earthwork, drainage installation, instream activities, pit development or expansion, surfacing (including paving), and aggregate placement.

**road decommissioning:** Activities that result in the stabilization and restoration of unneeded roads to a more natural state (36 CFR 212.1, FSM 7703). Road decommissioning activities include revegetation, recontouring, water barring, roadbed scarification or ripping, culvert removal, berm construction, and side cast pullback. A road can also be “decommissioned” by taking it off the transportation system data base and removing the road sign that indicates the road number. This approach is used when a road is naturally closed and is hydrologically stable.

**road density:** An indicator of the concentration of roads in an area.

**road maintenance:** The ongoing upkeep of a road necessary to retain or restore the road to the approved road management objective.

**road maintenance levels (MLs):** Maintenance levels define the level of service provided by, and maintenance required for, a specific road. Maintenance levels must be consistent with road management objectives and maintenance criteria. Roads assigned to MLs 2 through 5 are either constant service roads or intermittent service roads during the time they are open to traffic.

**Level 1:** Assigned to intermittent service roads during the times they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resources to acceptable levels and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are prohibit and eliminate.

Roads receiving ML 1 maintenance may be of any type, class, or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at ML 1, they are closed to vehicular traffic, subject to prohibitions and restrictions, and may be available and suitable for nonmotorized users.

ML 1 maintenance activities include road condition surveys, evaluation, and monitoring of maintenance needs. Activities include limited equipment operation, opening closed roads, manual cleaning of drainage structures, and vegetation management that stabilizes or reduces erosion. Repairs are scheduled and completed within funding limitations when critical resource damage is reported.

Roadway activities including blading, clearing logs, and noncritical repairs that can be delayed are accomplished when the road is placed in an active status.

**Level 2:** Assigned to roads open for use by high-clearance vehicles. Providing access for passenger cars is not a consideration. Traffic is normally minor, usually consisting of administrative, permitted, dispersed recreation, and/or other specialized uses. Log hauling may occur. Appropriate traffic management strategies are either to discourage or prohibit passenger cars or to accept or discourage high-clearance vehicles.

ML 2 maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Many roads in this category have grass in the travel way. User comfort is not a consideration.

**Level 3:** Assigned to roads open and maintained for travel by prudent drivers in standard passenger cars. User comfort and convenience are not considered priorities.

Roads in this maintenance level are typically low-speed, single-lane, with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are encourage or accept. Discourage or prohibit strategies may be employed for certain classes of vehicles or users.

ML 3 maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads.

**Level 4:** Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double-lane and aggregate-surfaced. However, some roads may be single-lane. Some roads may be paved and/or dust abated. The most appropriate traffic-management strategy is encourage. However, the prohibit strategy may apply to specific classes of vehicles or users at certain times.

ML 4 maintenance activities include roadside brushing, hazard tree removal, surface blading, drainage maintenance, structure maintenance, clearing logs, slide and slip cleanup and repair, sign maintenance and surface replacement. Drainage function and soil stabilization are of prime importance. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads.

**Level 5:** Assigned to roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved. Some may be aggregate-surfaced and dust-abated. The appropriate traffic management strategy is encourage.

ML 5 maintenance activities include roadside brushing, hazard-tree removal, surface blading, drainage maintenance, structure maintenance, logging out, slide and slip cleanup and repair, sign maintenance and surfacing replacement. Drainage function and soil stabilization are of prime importance. Dust abatement and more frequent blading may be needed on segments of multi-purpose roads. All of the ML 5 roads within a national forest have a permanent (paved) surface.

**road management objectives:** Road management objectives define the level of service provided by a National Forest System road consistent with the surrounding recreation opportunity spectrum (ROS) class.

**semi-primitive nonmotorized (SPNM):** Most semi-primitive nonmotorized areas do not have developed roads. All motorized traffic is prohibited. Semi-primitive nonmotorized roads provide hiking or equestrian trails on closed or decommissioned roads.

**semi-primitive motorized (SPM):** Semi-primitive motorized roads are generally used for four-wheel drive, logging, or ranching activities. Passenger-car use is discouraged by entrance conditions or signage. Users can expect SPM roads where there are no attractions such as viewpoints or trailheads.

- ◆ **low-level SPM:** Native surface roads suitable for high-clearance vehicles but not passenger cars or vehicles towing trailers. Users may need to back vehicles for long distances when meeting oncoming traffic. Maintenance activities occur usually every five years or when resource needs are identified. Roads are allowed to “brush in” and users are responsible for removing trees blocking the road. Ruts and potholes are accepted if they do not contribute to sediment loading. Corresponds to road ML 2 and Traffic Service Level D (abbreviated: 2-D).
- ◆ **high-level SPM:** Single-lane native surface road or road surfaced with spot rock, strip rock or pit run material suitable for high-clearance vehicles. The road may have infrequent turnouts. Pit run material is applied to the road surface, but is not grid rolled, leaving a rough, rocky surface that drains well and discourages passenger car use. User maintenance is the same as for the low-level SPM. This standard meets resource and safety needs and is the minimum standard for accessing attractions such as viewpoints or trailheads. Maintaining current road alignment, road surface type, and corridor width are emphasized. Corresponds to ML 2 and Traffic Service Level C (abbreviated: 2-C).

**rural (R):** Rural is generally the highest standard of road. These arterial roads provide the main access to the national forest lands but generally lack the speeds and alignment provided by state highways. Roads are double-lane with a road-surface treatment and generally 24-feet wide. The road has center striping and often stripes marking the shoulders. Corresponds to a road Maintenance Level 5 and Traffic Service Level A (abbreviated: 5-A).

**road prism:** an area consisting of the road surfaces and any cut slope and road fill.

**road reconstruction:** Activity that results in improvement or realignment of an existing classified road as defined below. Reconstruction activities may include vegetation clearing and grubbing, earthwork, drainage installation, instream activities, surfacing (including paving), and aggregate placement.

**road improvement:** Activity that results in an increase of an existing road's traffic service level, expands its capacity, or changes its original design function.

**road realignment:** Activity that results in a new location of an existing road or portions of an existing road and treatment of the old roadway (36 CFR 212.1).

**road restoration:** Road restoration activities are commensurate with the assigned maintenance level and include storm proofing, bridge replacement, installation of drainage dips and water bars, culvert installation and upgrade, surface shaping, and draining, surface material processing. Refer to road maintenance.

**roads subject to the Highway Safety Act:** National Forest System roads open to use by the public for standard passenger cars. This includes roads with access restricted on a seasonal basis and roads closed during extreme weather conditions or for emergencies, but which are otherwise open for general public use.

**road surface types:**

**asphalt/concrete:** A well-graded aggregate and asphalt cement.

**aggregate:** Stone, slag, gravel, or any other hard, inert, mineral material meeting certain specified quality requirements for use in a road pavement or surfacing structure.

**chip seal:** A road surface treatment consisting of one or more spray applications of asphalt followed immediately by an application of aggregate (chips) on a paved surface.

**grid-rolled:** Aggregate consisting of native materials of a quality that can be taken directly from a given source, without crushing or screening, and broken down to a specified maximum dimension on the road by grid-rolling.

**paved:** One or more bituminous bound layers of aggregate placed on a prepared road foundation.

**pit run:** Aggregate consisting of native materials from a given source with a maximum size and grading suitable for placing directly on a road without crushing or screening.

**native surface:** A road surface consisting of soil or aggregate materials naturally existing at the road location.

**spot rock:** Aggregate placed on a road as a pavement or surfacing structure in designated areas that are not continuous throughout the entire length of the road.

**strip rock:** Aggregate placed on a road as a surfacing structure in designated areas or portions of a road greater than 200 feet in length but not continuous throughout the entire length of the road.

**surface treated:** One or more applications of asphalt or other processed or natural materials to a road surface to provide traction, abate dust, protect, or renew the surface without increasing pavement structural capacity. Surface treatment is commensurate with existing surface.

**runoff (surface):** Fresh water from precipitation and melting ice that flows on the earth's surface into nearby streams, lakes, wetlands, or reservoirs.

## S

**salmonids:** Fishes of the family Salmonidae, including salmon, trout, chars, whitefish, ciscoes, and grayling.

**salvage harvest:** Harvest of trees that are dead, dying, or deteriorating due to fire, wind, insect or other damage, or disease.

**satisfactory condition:** A condition in which the soil is adequately protected and the forage species composition and production meets the land management plan objectives or the trend in forage species composition and production is acceptable.

**savannah:** The transitional biome between grassland and desert or desert and rainforest, typically having drought resistant vegetation dominated by grasses with scattered tall trees.

**scabland:** A region characterized by elevated tracts of rocky ground with little or no soil cover.

**scale:** (1) The level of resolution under consideration (for example, broad-scale or fine-scale); (2) the ratio of length on a map to true length.

**scenery management system (SMS):** The SMS is the method that was adopted after the forest plan was completed in 1990. The SMS utilizes two indicators to determine desired landscape character: ecological landscape integrity and scenic integrity. Ecological landscape integrity evaluates whether the landscape is managed in a sustainable and ecologically sound manner. Scenic integrity evaluates whether the landscape character is being managed in a way that conserves constituent values in terms of the level of human-caused deviations that are acceptable to the public (USDA Forest Service 1993 SMS HANDBOOK).

**scenic area:** Places of outstanding or matchless beauty that require special management to preserve these qualities. They may be established under 36 CFR 294.1 whenever lands possessing outstanding or unique natural beauty warrant this classification.

**scenic class:** Scenic class indicates the importance or value of a particular landscape determined by constituent information.

**scenic identity:** The scenic image and identity is the landscape character of an area. The landscape character identifies the "ideal" or optimal set of valued scenery attributes and describes the setting provided by these scenery attributes within each biophysical setting. It is important to understanding of the process, structure, and functions that support the valued set of scenery attributes. This understanding helps identify conditions and stressors that put scenery resources at risk.

**scenic integrity level:** Measures the degree to which a landscape is free from visible disturbances that detract from the natural or socially valued appearance. Scenic integrity objectives establish the desired level of scenic integrity for an area. Scenic stability measures the degree to which the valued landscape character and its scenery attributes can be sustained through time and ecological progression. Scenic stability objectives establish the desired level of scenic stability for a particular area. It is used to describe an existing situation, an objective for management, or desired conditions.

**very high scenic integrity:** Scenery with fully intact landscape features and scenic compositions presenting the optimal landscape character in complete harmony, with very minute, if any, scenic discordance. Due to the optimal scenic integrity of the physical, biological, and cultural features in these scenic compositions, the landscape character and sense of place are expressed at the highest possible level. Very high scenic integrity is most compatible with wilderness, backcountry, biophysical, or cultural preserves, and other special classification areas.

**high scenic integrity:** Scenery with whole or nearly intact landscape features and scenic compositions that present the optimal landscape character completely or nearly in full, and contain scenic discordances that are not evident.

**moderately high scenic integrity:** Scenery with slightly altered landscape features and compositions in which the valued landscape character is the dominant scenic impression, yet minor discordance is apparent, but visually subordinate. The “moderate” level of scenic integrity in the Scenery Management Handbook has been split into two categories to reflect more accurately the scenic conditions on the in the Blue Mountains.

**moderately low scenic integrity:** Scenery with altered landscape features and compositions that display a beginning dominance of valued landscape character expression and readily noticeable discordance.

**low scenic integrity:** Scenery with obviously altered landscape features and compositions that dominate yet still express some aspects of valued landscape character. The scenic harmony of the valued landscape character is seriously fragmented and barely restorable within reasonable periods and resource expenditures.

**very low scenic integrity:** Scenery with extremely altered landscape features and composition that no longer sustains significant aspects of valued landscape character. The scenic harmony of the optimal landscape character does not exist and its restoration may be impossible if not unrealistic.

**scenic integrity objective:** An established goal for the management of the scenic resource applied to a specific portion of the forest.

**scenic river areas:** Refer to Wild and Scenic River.

**scenic river:** Refer to Wild and Scenic River.

**scoping process:** A part of the NEPA process; the early stages of preparation of an environmental impact statement, early and open activities used to solicit public opinion, receive comments and suggestions, and determine the scope and significance of the issues to be considered in the development and analysis of a range of actions, alternatives, and impacts to be considered. Scoping may involve public meetings, telephone conversations, mailings, letters, or other contacts (40 CFR 1501.7).

**screening:** The reduction or elimination of the visual impact of any structure or land modification as seen from any public travel route within the national forests.

**security:** An area where wildlife, such as elk, retreat to for safety when disturbance in their usual range is intensified, such as by logging activities or during the hunting season.

**secondary productivity:** The growth of animal species that use the products derived from the growth and accumulation of plant biomass (primary productivity).

**sediment:** Solid materials, both mineral and organic, in suspension or transported by water, gravity, ice, or air; may be moved and deposited away from their original position and eventually will settle to the bottom.

**sediment regime:** The rate, frequency, magnitude, and duration of sediment movement. Refer to flow regime.

**selective cutting:** Single-tree or group-selection cutting is the periodic removal of trees individually or in small groups from an uneven-aged forest in order to maintain diverse stands, with the sustainability and improvement of the forest using an ecosystem approach to management being a primary consideration.

**self-sustaining populations:** Populations that are sufficiently abundant, interacting, and well-distributed in the plan area, within the bounds of their life history and distribution of the species and the capability of the landscape, to provide for their long-term persistence, resilience and adaptability over multiple generations.

**sensitive soils:** Forest land areas that have a moderate to very high hazard for soil compaction. Erosion, displacement, mass wasting, or forest floor displacement.

**sensitive species:** Plant or animal species identified by a regional forester for which population viability is a concern either: 1) because of significant current or predicted downward trends in population numbers or density; or 2) because of significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. Those species that have appeared in the Federal Register as proposed for classification or are under consideration for official listing as endangered or threatened species, that are on an official state list, or that are recognized by the regional forester as needing special management to prevent placement on federal or state lists.

**seral:** Refers to the stages that plant communities go through during the progression in structure and composition over time. Development stages have characteristic structure and plant species composition. See succession for definitions of different seral stages.

**seral stage:** The developmental phase of a forest stand or rangeland with characteristic structure and plant species composition.

**shade intolerant:** Species of plants that do not grow well in or die from the effects of too much shade. Generally, these are fire-tolerant species.

**shade tolerant:** Species of plants that can develop and grow in the shade of other plants. Generally, these are fire-intolerant species.

**shrubland:** Area of land where the potential vegetation is dominated by shrubs.

**short term:** Generally refers to a period of 10 years or less.

**silvicultural system:** A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method

of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of forest thereby produced.

**single-story:** Vegetation with a single canopy layer.

**site:** (1) A specific location of an activity or project, such as a campground, a lake, or a stand of trees to be harvested; (2) The location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined or vanished, where the location itself maintains historical or archeological value regardless of the value of any existing structure [36CFR65] (historic or archaeological definition).

**site-potential tree:** The average maximum height of the tallest trees for a given site class.

**snag:** A standing dead tree usually greater than five feet in height and six inches in diameter at breast height (d.b.h.).

**social well-being:** A condition that enables citizens, communities, and visitors to contribute to their wellness, values and quality of life.

**society:** A group of people who have a common homeland, are interdependent, and share a common culture.

**soil:** The earth material that has been so modified and acted upon by physical, chemical, and biological agents that it will support rooted plants.

**soil function:** The characteristic physical and biological activity of soils that influences productivity, capability, and resiliency.

**soil productivity:** The inherent capacity of a soil to produce plant growth, due to the soil's chemical, physical, and biological properties (such as depth, temperature, water-holding capacity, and mineral, nutrient, and organic matter content). It is often expressed by some measure of biomass accumulation.

**soil quality:** The capacity of a soil to function within ecosystem boundaries to sustain biological productivity, maintain environmental quality, and promote plant and animal health.

**soil stability:** (1) Mass stability of the soil profile or resistance to mass failure; (2) stability of the soil surface with respect to accelerated sheet, rill, and gully erosion processes.

**soil surveys:** All soil surveys are made by examining, describing, and classifying soils in the field and delineating their areas on maps. The map scale for field mapping must be large enough to allow areas of minimum size to be delineated legibly. Recognition of the different soil survey levels is helpful for communicating about soil surveys and maps, even though the levels cannot be sharply separated from each other. The order of a survey is consequence of field procedures, the minimum size of delineation, and the kinds of map units that are used.

**Order I Surveys:** Are for very intensive land uses requiring very detailed information about soils, generally in small areas. The information can be used in planning for irrigation, drainage, truck crops, citrus or other specialty crops, experimental plots, individual building sites, and other uses that require a detailed and very precise knowledge of the soils and their variability.

**Order II Surveys:** Are for intensive land uses that require detailed information about soil resources for making predictions of suitability for use and of treatment needs. The

information can be used in planning for general agriculture, construction, urban development, and similar uses that require precise knowledge of the soils and their variability.

**Order III Surveys:** Are for land uses that do not require precise knowledge of small areas or detailed soils information. Such survey areas are usually dominated by a single land use and have few subordinate uses. The information can be used in planning for range, forest, recreational areas, and in community planning.

**Order IV Surveys:** Are for extensive land uses that need general soil information for broad statements concerning land-use potential and general land management. The information can be used in locating, comparing, and selecting suitable areas for major kinds of land use, in regional land-use planning, and in selecting areas for more intensive study and investigation.

**Order V Surveys:** Collect soils information in very large areas at a level of detail suitable for planning regional land use and interpreting information at a high level of generalization. The primary use of this information is selection of areas for more intensive study.

**source habitat:** Habitat in such conditions that result in a positive or increasing population growth for a particular species. Those characteristics of vegetation that support long-term wildlife species persistence, or characteristics of vegetation that contribute to stable or positive population growth for a species in a specified area and time. Source habitats are described using dominant vegetation cover type and structural stage combinations that can be estimated reliably at the 247-acre (100-hectare) patch scale. Various combinations of these cover type-structural stages make up the source habitats for the terrestrial species discussed in this FEIS, and provide the range of vegetation conditions required by these species for food, reproduction, and other needs (Wisdom et al. 2000).

**spatial:** Related to or having the nature of space.

**special habitat:** A habitat which has a special function not provided by plant communities and successional stages. Includes riparian zones, snags, dead and downed wood, and edges (Thomas 1979).

**specially designated areas:** Also referred to as special areas and is one of the plan components. Areas designated because of their unique or special characteristics, such as botanical areas or areas designated by statute or administrative processes such as wilderness, wild and scenic rivers, or research natural areas.

**special use authorization:** A permit, term permit lease, or easement which allows occupancy, use, rights, or privileges of national forest lands (36 CFR 251.51).

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**species:** A population or series of populations of organisms that can interbreed freely with each other but not with members of other species.

**species composition:** The species that occur on a site or in a successional stage of a plant community (Thomas 1979).

**species diversity:** The number of species occurring in a given area.

**species of concern:** Species for which management actions may be necessary to prevent listing under the Endangered Species Act. Criteria for selection as a species of concern include:

- Identified as candidate and proposed for listing under the Endangered Species Act.
- Has a G1 to G3 NatureServe ranking.
- Intraspecific taxa with NatureServe ranking of T1 to T3.
- Has been petitioned for listing under the Endangered Species Act.

**sprouter:** Flora capable of vegetative reproduction from roots or stems.

**stand:** A group of trees in a specific area that are sufficiently alike in composition, age, arrangement, and condition so as to be distinguishable from the forest in adjoining areas.

**stand composition:** The vegetative species that make up the stand.

**stand density:** Refers to the number of trees growing in a given area, usually expressed in trees per acre.

**stand initiation (SI):** Stand conditions that arise following a stand-replacing disturbance such as wildfire or timber harvest. Colonizers disperse seed into disturbed areas, the seed germinates, and new seedlings establish and develop. A single canopy stratum of tree seedlings and saplings is present. Average tree diameters are generally less than five inches.

**stand-replacement fire:** A fire severity classification where at least 75 percent replacement of the upper layer of vegetation is removed.

**stand structure:** The mix and distribution of tree sizes, layers, and ages in a forest. Some stands are all one size (single-story) some are two-story, and some are a mix of trees of different ages and sizes.

**standard:** A standard is a mandatory constraint on project and activity decision making, established to help achieve or maintain the desired condition or conditions, to avoid or mitigate undesirable effects, or to meet applicable legal requirements.

**state and transition model:** Nonequilibrium ecological model to describe vegetation dynamics of rangeland sites as adopted by the Natural Resource Conservation Service. Models recognize multiple steady states of vegetation and emphasize disturbance processes.

**strategy:** Part two of a land management plan that explains the suitable uses and includes the special designated areas, and management categories.

**stream channel:** Refer to channel.

**stem exclusion:** The stage created when vigorous, fast growing trees occupy the growing space. Establishment of new trees is precluded by a lack of sunlight or moisture. This stage could be maintained by thinning or fire. Stands only have one dominant layer. Average tree diameters range from 5 to 20 inches.

**stringers:** Relatively narrow areas suitable to be occupied by forested plant associations within a landscape that is otherwise unsuitable due to site or environmental factors.

**stronghold:** Directly associated with strong populations. For native fish, strong populations have stable numbers or are increasing, and all major life history forms that historically occurred within the watershed are present.

**stocking level:** The ratio of the current stand density to an assumed ideal level of stand density.

**structure:** (1) Any permanent building or facility, or part thereof such as barns, outhouses, residences, and storage sheds including transmission line systems, substations, commercial radio transmitters, relays or repeater stations, antennas, and other electronic sites and associated structures; or (2) the size and arrangement of vegetation, both vertically and horizontally.

**structural stage:** A stage of development of a vegetation community that is classified on the dominant processes of growth, development, competition, and mortality.

**subalpine:** A terrestrial community that generally is found in harsher environments than the montane terrestrial community. Subalpine communities are generally colder than montane and support a unique clustering of wildlife species.

**subbasin:** A drainage area of approximately 800,000 to 1,000,000 acres, equivalent to a 4<sup>th</sup>-field HUC watershed.

**subsistence:** Customary and traditional uses of wild renewable resources (plants and animals) for food, shelter, fuel, clothing, tools, etc.

**subwatershed:** A drainage area of approximately 20,000 acres, equivalent to a 6<sup>th</sup>-field HUC (12 digit). Hierarchically, subwatersheds (6<sup>th</sup> field HUC) are contained within watersheds (5<sup>th</sup> field HUC, which in turn are contained within a subbasin (4<sup>th</sup> field HUC).

**succession:** The sequential replacement over time of one plant community by another, in the absence of major disturbance. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages of succession are often referred to as seral stages. Developmental stages are as follows:

**early seral:** Communities that occur early in the successional path and generally have less complex structural developmental than other successional communities. Seedling and sapling size classes are an example of early seral forests.

**mid-seral:** Communities that occur in the middle of the successional path. For forests, this usually corresponds to the pole or medium sawtimber growth stages.

**late-seral:** Communities that occur in the later stage of the successional path with mature, generally larger individuals, such as mature forests.

**suitable habitat:** Habitat that currently has both the fixed and variable stand attributes for a given species habitat requirements. Variable attributes change over time and may include seral stage, cover type and overstory canopy cover.

**suitability:** The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

**suitable uses:** Uses that are compatible with the desired conditions and objectives for a given area which are identified as guidance for project and activity decision making and do not represent a commitment or final decision approving projects or activities.

**surface fire:** A fire that burns surface litter, dead woody fuels, other loose debris on the forest floor, and some small vegetation without significant movement into the overstory, usually with a flame less than a few feet high.

**surface water development:** The practice of diverting or impounding surface water sources by the construction of dams, diversions, canals, or ditches for use, such as irrigation, livestock watering, and human consumption.

**sustainability:** Meeting needs of the present generation without compromising the ability of future generations to meet their needs. Sustainability is composed of desirable social, economic, and ecological conditions or trends interacting at varying spatial and temporal scales, embodying the principles of multiple-use and sustained-yield (FSM 1905).

**sustained-yield of products and services:** The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment of the productivity of the land.

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## T

**talus:** A slope formed by the accumulation of rock debris at the base of a cliff.

**temporal:** Related to time.

**terrestrial:** Pertaining to the land.

**terrestrial wildlife:** Wildlife species that dwell primarily on land (Thomas 1979).

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**thermal regulation:** The processes by which many animals actively maintain the temperature of all or parts of their body; the protection against local climatic extremes provided by, for example, shade produced by vegetation, protection from wind or sun, or protection from extreme cold.

**thinning:** An operation to remove stems from a forest for the purpose of reducing fuel, maintaining stand vigor, regulating stand density/composition, or for other resource benefits. Although thinning can result in commercial products, thinning generally refers to noncommercial operations.

**threatened species:** Species listed under the Endangered Species Act by either the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. These species are likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

**timber harvest:** The removal of trees for wood fiber utilization and other multiple-use purposes.

**timber production:** The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use.

For purposes of this subpart, the term timber production does not include production of fuelwood.

**total maximum daily load (TMDL):** A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources. The Clean Water Act, Section 303, establishes the water quality standards and TMDL programs.

**traditional cultural areas:** Those areas of the forest used by Native American Indian tribes for traditional activities and often referred to as "religious use areas" or "sacred areas." They may include areas traditionally used for gathering of special forest products.

**travel corridors:** An area of vegetation that provides completely or partially suitable habitat for animals to travel from one location to another.

**travel route:** A route, such as a county or national forest road or river or trail, that is open for use by members of the public.

**treaty-reserved right:** Tribal rights or interests reserved in treaties, by Native American Indian tribes for the use and benefit of their members. The uses include such activities as described in the respective treaty document. Only Congress may abolish or modify treaties or treaty rights.

**treaty resource:** A resource associated with the language in a specific treaty, usually interpreted to include collections or association of species; not limited to a single species. For example: fish may include all fish species (some treaties included rights to erect temporary houses for curing fish); roots and berries may include a wide variety of plants that will encompass the nature of the plants as they were used historically; grasses are necessarily included for the treaty reserved right to graze cattle or livestock. Hunting rights may include all species of animals hunted in historic and prehistoric times. As these apply to the Forest Service, they are public natural resources on national forest lands, to which American Indian tribes have reserved certain rights for taking or gathering.

**trend:** As used to define range conditions, the direction of change in range or forage condition or in ecological status.

**tribe:** Term used to designate any native American Indian tribe, band, nation, or other organized group or community which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians.

**trust resource:** A resource or property that constitutes a corpus or object of trust that is held in trust status by another (trustee) on behalf of a beneficiary. A trustee is usually a governmental entity (Secretary of the Interior) who is assigned a trust duty to care for resources that are for the exclusive use and benefit of Indian tribes and/or their members. A beneficiary may be an Indian tribe or individual tribal member, who has property being held in trust status, for example: land, money, timber, or any Indian-owned asset.

## U

**underburn:** A type of prescribed fire that burns ground vegetation and ladder fuels on the surface under a live tree overstory to meet specific management and/or resource objectives.

**understory:** Lower vegetation in a forest, the small trees and other woody species/shrubs growing under a more-or-less continuous cover of branches and foliage formed collectively by the taller adjacent trees and other woody growth.

**understory reinitiation (UR):** New age classes of trees establish as the overstory trees die or are thinned and no longer occupy all of the growing space. Regrowth of understory vegetation then occurs, and trees begin to develop in vertical layers. This stage contains multiple layers and multiple tree sizes. Average tree diameters range from 5 to 20 inches.

**uneven-aged management:** The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection.

**uneven-aged management (group selection):** The group selection variant of uneven-aged management is designed to facilitate the establishment of shade intolerant species, reduce damage to the residual stand, and lengthen the cyclic entry period. The opening created under the group selection prescription would often be no larger than one to two tree heights (as influenced by aspect and slope) so as not to lose the site protection afforded by the surrounding trees. Size, shape, and location of groups should be designed to achieve landscape character goals and scenic integrity objectives.

**uneven-aged management (single-tree selection):** This silvicultural system is intended to perpetuate uneven-aged stands composed of intermingled trees of differing ages, species, and sizes. Individually selected trees are removed to maintain a desired range of tree sizes over a prescribed distribution. Cyclic entries designed to control the structure and species composition and provide the openings necessary for establishment and growth of the continuously occurring regeneration are a function of the site quality and resource considerations.

**ungulates:** Hoofed, plant-eating mammals such as elk, deer, and cattle.

**upland:** The portion of the landscape above the valley floor or stream.

**unroaded area:** Portion of the national forest that does not contain classified roads. Refer to road.

**unsuitable range:** Areas of land that should not be used by livestock because of unstable soils.

**utility corridor:** A parcel of land, without fixed limits or boundaries that is being used as the location for one or more transportation or utility rights-of-way.

## V

**vascular plants:** Plants that have specialized tissues which conduct nutrients, water, and sugars, along with other specialized parts such as roots, stems, and reproductive structures. Vascular plants include flowering plants, ferns, shrubs, grasses, trees, and many others.

**vector:** An organism that carries or transmits a pathogenic agent from one host to another.

**vegetation management:** Activities designed primarily to promote the health of forest vegetation in order to achieve desired results. Vegetation management is the practice of manipulating the species mix, age, fuel load, and /or distribution of wildland plant communities within a prescribed or designated area in order to achieve desired results. It includes prescribed burning, grazing, chemical applications, biomass harvesting, and any other economically feasible method of enhancing, retarding, modifying, transplanting, or removing the aboveground parts of plants.

**vegetation utilization:** Indicates the degree to which vegetation is consumed by animals.

**vertebrate:** An animal with a backbone; mammals, fishes, birds, reptiles, and amphibians are vertebrates.

**viability:** In general, viability means the ability of a population of a plant or animal species to persist for some specified time into the future.

**viable population:** A population that is regarded as having the estimated numbers and distribution of reproductive individuals to ensure that its continued existence is well distributed in the project area.

**vision:** Part one of a land management plan that describes the roles, contribution, and desired conditions of the national. This section also contains monitoring measures to assess progress toward the desired conditions.

## W

**water right:** A right to use surface water or ground water evidenced by a court decree or by a permit or certificate approved by the state water resources department. Statutory exempt uses of surface water and ground water are not water rights, nor are time-limited licenses. A perfected water right is defined by applicant name, source, purpose, amount (quantity, rate and duty), season of use, priority date, point of diversion, place of use, and certificate number.

**water quality:** A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

**watershed:** (1) The region draining into a river, river system or body of water; or (2) subdivisions within a subbasin, which generally range in size from 40,000 to 250,000 acres; the fifth level (10-digit) in the hydrologic hierarchy.

**watershed condition classes:** Watersheds are rated as Class 1, 2, or 3.

**Class 1 Condition:** Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Drainage network is generally stable. Physical, chemical, and biological conditions suggest that soil, aquatic, and riparian systems are predominantly functional in terms of supporting beneficial uses.

**Class 2 Condition:** Watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. Portions of the watershed may exhibit an unstable drainage network. Physical, chemical, and biological conditions suggest that soil, aquatic, and riparian systems are at risk in being able to support beneficial uses.

**Class 3 Condition:** Watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition. A majority of the drainage network may be unstable. Physical, chemical, and biological conditions suggest that soil, aquatic, and riparian systems do not support beneficial uses.

**watershed function:** The processes acting on hillslopes and stream channel within a drainage basin that control the movement of water, wood, sediment, and nutrients.

**watershed integrity:** The degree to which the physical and biological processes affecting the movement of water, sediment, wood, and nutrients are operating within normally expected ranges.

**watershed runoff:** Refer to runoff.

**water yield:** The amount of water that flows from a watershed within a specific period of time.

**weed:** A plant considered undesirable, unattractive, or troublesome, usually introduced and growing without intentional cultivation.

**wetlands:** Those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances do or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds (Executive Order 11990, Section 7c).

**wild and scenic river (WSR):** Those rivers or sections of rivers designated as such by congressional action under the Wild and Scenic Rivers Act of 1968, as supplemented and amended. Wild and scenic rivers include all national forest lands within the designated wild and scenic river corridor (15). The following classifications are used:

**wild river areas:** Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.

**scenic river areas:** Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

**recreational river areas:** Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

**study river areas:** Those rivers formally designated by Congress to be studied under Sections 5(a) and 5(b) of the Wild and Scenic Rivers Act.

**wilderness area:** An area designated by congressional action under the Wilderness Act of 1964. Wilderness is defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation. Wildernesses are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or a primitive and unconfined type of recreation; are of

sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

**wildfire:** An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out (NWCG 2012).

**wildland:** A nonurban, natural area that contains uncultivated land, timber, range, watershed, brush or grassland.

**wildland fire:** Any non-structure fire that occurs in the wildland. Three distinct types of wildland fire have been defined and include wildfire, wildland fire use, and prescribed fire. (NWCG 2012).

**wildland fire situation analysis (WFSA):** A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economic, political, and resource management objectives (USDA Forest Service 1998).

**wildland fire suppression:** An appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources (USDA Forest Service 1998).

**wildland fire use:** The application of the appropriate management response to naturally-ignited wildland fires to accomplish specific resource management objectives in pre-defined designated areas outlined in Fire Management Plans. Operational management is described in the Wildland Fire Implementation Plan (WFIP) (NWCG 2012).

**wildland-urban interface (WUI):** The area directly adjacent to home and communities.

**windthrown:** Refers to trees blown over by the wind.

**winter range:** The area available to and used by wildlife (big game) during the winter season. Generally, lands below 4,000 feet in elevation, on south and west aspects, that provides forage and thermal/snow intercept.

**woodland:** Dry, low elevation areas with a potential vegetation type of juniper.

## X

**xeric:** Very dry region or climate; tolerating or adapted to dry conditions. Dry soil moisture regime. Some moisture is present but does not occur at optimum levels for plant growth. Irrigation or summer fallow is often necessary for crop production.



# Appendices

## Appendix A – Maps

- Map 1. Location of the Lower Joseph Creek Restoration Project
- Map 2. Wallowa-Whitman Forest Plan management areas within the Lower Joseph Creek Restoration Project boundaries
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## Appendix B - Forest plan direction, and other policies, laws, regulations, and agreements

This appendix compiles or summarizes:

- More information on other policies, laws, treaties, and regulations pertinent to the LJCRP mentioned in Chapter 1.
- Applicable forest plan direction, standards and guidelines applicable to the LJCRP.
- Amendments to the Wallowa-Whitman National Forest plan

	<b>Key federal and state policies applicable to the LJCRP</b>
<b>PACFISH</b>	In 1995, the “Interim Strategies for Managing Anadromous fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California” ( <b>PACFISH</b> ) Decision Notice amended the Forest Plan (US Department of Agriculture 1995). PACFISH added goals and objectives for anadromous fish habitat condition and function, and identified Riparian Habitat Conservation Areas (RHCAs), where management activities will meet interim standards and guidelines.
<b>Eastside Screens</b>	In 1993, the Forest Service adopted interim measures to preserve late-successional/old-growth forests on the eastside of the Cascade crest in Oregon and Washington until they could be replaced by more permanent and complete decisions. These measures, known as the Eastside Screens, consist of a series of procedures for screening proposed timber sales. Among other things, the <b>Eastside Screens</b> prohibit logging live trees greater than 21-inches in diameter at breast height. The adoption of the Eastside Screens amended all land and resource management plans (forest plans) for National Forests east of the Cascade Crest.
<b>Nez Perce Tribe Ceded Lands</b>	The Wallowa-Whitman National Forest, including the LJCRP, contains lands ceded by the <b>Nez Perce Tribe in 1855 through Treaty with the United States</b> . Although tribal lands were ceded to the Federal Government, tribal sovereignty and treaty rights were reserved. The Forest Service, through the Secretary of Agriculture, lies within the executive branch of government and therefore has a trust responsibility to consult, cooperate, and coordinate with federally recognized tribes regarding decisions or policies that have the potential to affect tribal interests. The Forest Service is also vested with a statutory authority and responsibility for managing natural resources and their associated habitats on NFS lands. These natural resources are considered treaty resources by the Nez Perce Tribe. The LJCRP is located entirely within traditional territory of the Chief Joseph Band of the Nez Perce subject to the rights the Tribe reserved, and the United States secured, in the Treaty of 1855. The Chief Joseph Band of the Nez Perce is a constituent member of, and, represented by, the Confederated Tribes of the Colville Reservation (CTCR). The CTCR was created by the Executive Order of 1872 as amended by the North-Half Agreement of 1891. The Colville Business Commission (CCT) delegated to the Tribal Historic Preservation Officer (THPO) the responsibility of representing the CCT with regard to cultural resource management issues throughout the traditional territories of their constituent tribes ( <i>pers. comm.</i> Guy Mora, THPO).
<b>Tribal Consultation</b>	The Forest Service <b>Tribal consultation</b> responsibilities are guided by a variety of laws and Executive Orders, including the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA) as amended, Archaeological Resources Protection Act (ARPA), American Indian Religious Freedom Act (AIRFA), National Forest Management Act (NFMA), Native American Graves Protection and Repatriation

	<b>Key federal and state policies applicable to the LJCRP</b>
	Act of 1990 (NAGPRA), and the American Indian Religious Freedom Act of 1978 (AIRFA). Executive Orders and Memoranda include Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and E.O. 13007 (Accommodation of Sacred Sites). Consultation is also guided by Forest Service policy to maintain a government-to-government relationship with federally recognized Tribes, coordinate land and resources management plans and actions with tribal land and resource management plans and actions to promote the health of ecosystems, and consult with Tribes on matters that may affect tribal rights and interests (FSM 1563.03). Forest Service policy also provides direction to develop land management goals and objectives within the framework defined by laws, Indian treaties, regulations, collaboratively developed public and Indian tribal values and desires, historical conditions, current and likely future ecological capabilities, a range of climate change predictions, the best available science, information, and technical and economic feasibility (FSM 2020.3). For a summary of staff to staff and government consultation between the IDT, Wallowa-Whitman National Forest, and the Nez Perce Tribe, refer to the Tribal Relations Specialist report.
<b>Heritage Resources</b>	The 2004 <b>Programmatic Agreement between Region 6 of the Forest Service and the Oregon State Heritage Protection Office (SHPO)</b> will guide compliance on heritage resource concerns.
<b>Invasive Plant Management</b>	USDA Forest Service, <b>PNW Region 2005 Invasive Plant Management Record of Decision</b> for invasive species management documented prevention actions and Region-wide standards for invasive species management (USDA Forest Service 2005). In March 2010, <b>the Final EIS for the WWNF Invasive Plants Treatment</b> was completed. A Record of Decision was signed on April 2, 2010, but due to litigation, cannot be fully implemented until a supplemental EIS (SEIS) is completed. Until the SEIS is completed, 17,000 acres of known infestations, and any newly identified infestations may be treated using only non-chemical methods. Continued herbicide use is site specific as outlined in the litigation settlement, 2012 Partial Vacatur Opinion and Order. The LJCRP includes sites covered under exhibit 1 (Approved treatments) of the Partial Vacatur. These sites were approved under the 92-94 Environmental Assessments and the 2010 EIS.
<b>Research Natural Areas</b>	Establishment of <b>research natural areas</b> has been sanctioned in the Code of Federal Regulations in Section 7 CFR 2.42, 36 CFR 251.23, and 36 CFR 219.25. Direction for establishment is provided in Forest Service Manual 4063 and in “A Guide for Developing Natural Area Management and Monitoring Plans” written by the Pacific Northwest Interagency Natural Area Committee.
<b>Clean Air Act</b>	<b>Clean Air Act:</b> All proposed prescribed burning would be conducted in compliance with National Ambient Air Quality Standards and Oregon Department of Environmental Quality (ODEQ) regulations and restrictions contained in the Oregon Smoke Management Plan (ODEQ Directive 1-4-1-601). Fuel activities can be timed to minimize the impacts of smoke on forest users and local communities. An operator’s burn plan is developed prior to ignition. On site weather conditions are monitored before, during, and after an ignition. Ocular smoke observations are made throughout the ignition phase. Residual smoke is monitored for dispersion and direction. No ignitions would occur if there is an air stagnation advisory in place within the northeast Oregon geographic area. No ignitions would occur if existing or forecast conditions would transport measurable smoke into downwind communities. The removal and direct treatment of biomass would reduce emissions should a wildfire occur. The effect of smoke under any action alternative would be short term. Particulate matter is not expected to exceed standards in the communities of concern.
<b>Other</b>	<b>National Forest Management Act (NFMA), National Environmental Policy Act</b>

	<b>Key federal and state policies applicable to the LJCRP</b>
<b>Policies, Laws, Treaties and Regulations</b>	(NEPA), <b>Council on Environmental Quality Regulations (CEQ)</b> , <b>Clean Water Act (CWA)</b> , <b>Endangered Species Act (ESA)</b> , <b>Regional Water Quality Control Board Requirements</b> , <b>Invasive Species Executive Order (EO) 13112</b> of February 3, 1999, <b>2013 National Strategic Framework for Invasive Species Management</b> , <b>2013 Oregon Dept. of Agriculture Noxious Weed Policy and Classification System</b> , <b>Migratory Birds EO 12962</b> of January 10, 2001, <b>Environmental Justice EO 12898</b> of February 11, 1994, <b>Executive Order 13186</b> (Responsibilities of Federal Agencies to Protect Migratory Birds), <b>ORS 2013 564.105</b> (Responsibility to protect and conserve native plants by Oregon state law), <b>USDA viability regulation 9500-004</b> 2008, <b>USFWS 2007 Recovery Plan for <i>Silene spaldingii</i></b> (Spalding's catchfly), and <b>other relevant Federal and State laws and regulations</b> , and <b>Forest Service manuals and handbooks</b> . This project is also consistent with the <b>Wallowa County Community Wildfire Protection Plan</b> (Wallowa County 2006a). Prescribed burning of forest fuels (logging slash or natural) will comply with <b>Oregon Administrative Rules (OAR) 629-048-0001 to 629-048-0500</b> (Smoke Management Rules) within any forest protection district as described in OAR 629-048-0500 to 0575.
	Analysis and documentation for this project has been prepared according to direction contained in the aforementioned policies, laws, treaties, and regulations.

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
<b><u>Forested Vegetation</u></b>	The detailed direction that affects the project-level vegetation analysis being undertaken in this proposed action are contained in the forest plan for the Wallowa Whitman National Forest (USDA 1990, as updated 2004) and the Hells Canyon NRA Comprehensive Management Plan (USDA 2003). These include the Forest-wide goals and standards and guidelines, HCNRA objectives, standards and guidelines and Management Area direction that has relevance to the proposed action
	<b>Forested Vegetation - Forest-Wide Standards and Guidelines</b>
<b>Diversity (FP 4-30)</b>	<ul style="list-style-type: none"> <li>• Retain, through precommercial and commercial thinning, a diversity of tree species based on site potential.</li> <li>• Allow for all natural species to function following vegetation manipulation.</li> </ul>
<b>Timber Management (FP 4-48)</b>	<ul style="list-style-type: none"> <li>• Silvicultural Systems – Prepare silvicultural prescriptions prior to all harvest activities. These prescriptions will be reviewed by a certified silviculturist.</li> <li>• Silvicultural Systems – Select silvicultural systems which will, to the extent possible and within the intent of the land management objectives:               <ol style="list-style-type: none"> <li>a. Permit the production of a volume of marketable trees sufficient to utilize all trees that meet utilization standards and are designated for harvest.</li> <li>b. Permit the use of an available and acceptable logging method that can remove logs and other products without excessive damage to the identified desirable residual vegetation.</li> <li>c. Be capable of providing special conditions, such as a continuous canopy or continuous high density live root mats, when required by critical soil conditions or as needed to achieve particular management objectives, such as streamside protection, wildlife needs, and visual enhancement.</li> <li>d. Permit control of vegetation to establish desired numbers and rates of growth of trees, as well as vegetation needed to achieve other management objectives identified in site-specific silvicultural prescriptions.</li> </ol> </li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<ul style="list-style-type: none"> <li>e. Promote a stand structure and species composition that minimizes serious risk of damage caused by mammals, insects, disease, or wildfire, and will allow treatment of existing insect, disease, or fuel conditions.</li> <li>f. Be capable of achieving management objectives such as those for streamside protection, wildlife needs, and visual resources.</li> <li>g. Include consideration of fuel treatment commensurate with resource needs.</li> <li>h. Be the most economical system to meet the desired objectives.</li> </ul> <ul style="list-style-type: none"> <li>• Reforestation - Selection of reforestation methods will be made on a site-by-site basis during project-level analysis. This analysis will always consider the option of natural regeneration. Design harvest and regeneration practices so that there is reasonable assurance of adequate restocking within five years after final harvest.</li> </ul>
<b>Miscellaneous (FP 4-56)</b>	<ul style="list-style-type: none"> <li>• Tree Encroachment. Recognize natural grasslands and meadows primarily for the forage value and habitat they provide. Encroachment of trees on meadows and other high forage producing nontimbered sites may be prevented if such action is warranted based on site specific analysis including consideration of other resource objectives.</li> </ul>
<b>Regional Forester Amendment #2</b>	<p>In August 1993 the Regional Forester issued a letter providing direction to eastside National Forests on retaining old-growth attributes at the local scale and moving toward the historic range of variability (HRV) across the landscape. These became known as the "eastside screens." A subsequent decision notice in May 1994 amended all eastside Forest plans (including the Wallowa Whitman) to include these standards.</p> <p>The interim wildlife standard has two possible scenarios to follow based on the Historical Range of Variability (HRV) for each biophysical environment within a given watershed. For the purposes of this standard, late and old structural stages (LOS) can be either "Multi-strata with Large Trees" (MSLT), or "Single Strata with Large Trees" (SSLT), as described in Table 1 of the Ecosystem Standard. These LOS stages can occur separately or in some cases, both may occur within a given biophysical environment. LOS stages are calculated separately in the interim ecosystem standard. Use Scenario A whenever anyone type of LOS is below HRV. If both types occur within a single biophysical environment and one is above HRV and one below, use Scenario A. Only use Scenario B when both LOS stages within a particular biophysical environment are at or above HRV.</p> <p>Scenario A - If either one or both of the late and old structural (LOS) stages falls BELOW HRV in a particular biophysical environment within a watershed, then there should be NO NET LOSS OF LOS from that biophysical environment. DO NOT allow timber sale harvest activities to occur within LOS stages that are BELOW HRV.</p> <p>1) Some timber sale activities can occur within LOS stages that are within or above HRV in a manner to maintain or enhance LOS within that biophysical environment. It is allowable to manipulate one type of LOS to move stands into the LOS stage that is deficit if this meets historical conditions.</p> <p>2a) Maintain all remnant late and old seral and/or structural live trees <math>\geq 21</math>" DBH that currently exist within stands proposed for harvest activities.</p> <p>2b) Manipulate vegetative structure that does not meet late and old structural (LOS) conditions, (as described in Table 1 of the Ecosystem Standard), in a manner that</p>

	<p><b>Forest plan direction, standards and guidelines applicable to the LJCRP</b></p>
	<p>moves it towards these conditions as appropriate to meet HRV.</p> <p>2c) Maintain open, parklike stand conditions where this condition occurred historically. Manipulate vegetation in a manner to encourage the development and maintenance of large diameter, open canopy structure. (While understory removal is allowed, some amount of seedlings, saplings, and poles need to be maintained for the development of future stands).</p> <p>3) Maintain connectivity and reduce fragmentation of LOS stands by adhering to the following standards: INTENT STATEMENT: While data is still being collected, it is the best understanding of wildlife science, today, that wildlife species associated with late and old structural conditions, especially those sensitive to "edge," rely on the connectivity of these habitats to allow free movement and interaction of adults and dispersal of young. Connectivity corridors do not necessarily meet the same description of "suitable" habitat for breeding, but allow free movement between suitable breeding habitats. Until a full conservation assessment is completed that describes in more detail the movement patterns and needs of various species and communities of species in eastside ecosystems, it is important to insure that blocks of habitat maintain a high degree of connectivity between them, and that blocks of habitat do not become fragmented in the short-term.</p> <p>4) Adhere to the following specific wildlife prescriptions. These standards are set at MINIMUM levels of consideration. Follow Forest Plan standards and guidelines when they EXCEED the following prescriptive levels: a) Snags, Green Tree Replacements and Down Logs:</p> <p>INTENT STATEMENT - Most (if not all) wildlife species rely on moderate to high levels of snags and down logs for nesting, roosting, denning and feeding. Large down logs are a common and important component of most old and late structural forests. Past management practices have greatly reduced the number of large snags and down logs in managed stands.</p> <p>(1) All sale activities (including intermediate and regeneration harvest in both even-age and uneven-age systems, and salvage) will maintain snags and green replacement trees of &gt; 21 inches DBH, (or whatever is the representative DBH of the overstory layer if it is less than 21 inches), at 100% potential population levels of primary cavity excavators. This should be determined using the best available science on species requirements as applied through current snag models or other documented procedures. NOTE: for Scenario A, the live remnant trees (&gt;=21" DBH) left can be considered for part of the green replacement tree requirement.</p> <p>(2) Pre-activity (currently existing) down logs may be removed only when they exceed the quantities listed below. When pre-activity levels of down logs are below the quantities listed, do not remove downed logging debris that fits within the listed categories. It is not the intention of this direction to leave standing trees for future logs in addition to the required snag numbers, or to fall merchantable material to meet the down log requirements. The snag numbers are designed to meet future down log needs in combination with natural mortality. Exceptions to meeting the down log requirement can be made where fire protection needs for life and property cannot be accomplished with this quantity of debris left on site. The down log criteria are not intended to preclude the use of prescribed burning as an activity fuels modification treatment. Fire prescription parameters will ensure that consumption will not exceed 3 inches total (1 1/2 inch per side) of diameter</p>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>												
	<p>reduction in the featured large logs (sizes below). Tools such as the CONSUME and FOFEM computer models, fire behavior nomograms, and local fire effects documentation can aid in diameter reduction estimates.</p> <p>Leave logs in current lengths; do not cut them into pieces. Longer logs may count for multiple "pieces" without cutting them. Cutting them may destroy some habitat uses and also cause them to decay more rapidly. It is also not expected that the "pieces" left will be scattered equally across all acres.</p> <table><tr><th>Species</th><th>Pieces per Acre</th><th>Diameter Small End (inches)</th><th>Piece Length &amp; Total Linear Length</th></tr><tr><td>Ponderosa pine</td><td>3-6</td><td>12</td><td>&gt;6 feet; 20 – 40 feet</td></tr><tr><td>Mixed conifer</td><td>15-20</td><td>12</td><td>&gt;6 feet; 100 -140 feet</td></tr></table>	Species	Pieces per Acre	Diameter Small End (inches)	Piece Length & Total Linear Length	Ponderosa pine	3-6	12	>6 feet; 20 – 40 feet	Mixed conifer	15-20	12	>6 feet; 100 -140 feet
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<b>Range of Variation Guidance for Forest Vegetation Project Planning</b>	<p>The Regional Forester Amendment #2 of June 12, 1995 established interim riparian, ecosystem, and wildlife standards for timber sales (these standards are referred to as the “Eastside Screens”). Items 5 and 6 of the Eastside Screens require that a range of variation approach be used when comparing historical reference and current conditions, incorporating the best available science</p> <p>A letter from the Wallowa Whitman Forest Supervisor to the forest leadership team dated 7/27/2011 replaced previous guidance for RV analysis. The letter states that Range of Variation Recommendations for Dry, Moist and Cold Forests, by David Powell, May 2010, incorporates the best available science and that all future forest vegetation planning work should utilize the range of variation tables in Powell 2010.</p>												
	<b>Vegetation - Hells Canyon NRA Comprehensive Management Plan – Objectives, Standards and Guidelines (Appendix C, Table C1)</b>												
<b>Forested Vegetation, Grasslands and Forest Understory (C-31 to 34)</b>	<p>Objectives -</p> <ul style="list-style-type: none"><li>• Veg-O1: Provide for restoration of ecosystem function, where determined to be needed, in a manner compatible with the primary objectives of the HCNRA Act, congressionally designated areas, and established Forest Plan MAs</li><li>• Veg-O2 for MAs 7, 10, and 11: Manage forest and grassland vegetation to maintain viable and healthy ecosystems that ensure: the protection and enhancement of fish and wildlife habitats; conservation of scenic, and scientific values; preservation of biologically unique species, habitats, and rare combinations of outstanding ecosystems; protection and enhancement of a wild and scenic river's outstandingly remarkable values; and compatible public outdoor recreation. (New)</li></ul>												
<b>Forested Vegetation (C-34 to 42)</b>	<p>Objectives -</p> <ul style="list-style-type: none"><li>• For-O1: Outside wilderness, manage forested vegetation to restore the HRV for structural stages</li></ul> <p>Standards –</p> <ul style="list-style-type: none"><li>• For-S3 for MAs 7, 10, 11: Silvicultural treatment and PF shall be the primary methods used to achieve a desired forested vegetation structure.</li><li>• For-S5 for MAs 7, 10, and 11: Silvicultural treatment activities shall maintain a viable and healthy ecosystem and be designed to replicate the naturally-occurring processes which shape the character of the landscape. Natural disturbance regimes most commonly operating in the HCNRA include: wildfire, high winds, and insect/disease infestations. Forest vegetation and fuels management activities based upon ecological principles can be implemented to mimic these kinds of natural disturbance events.</li><li>• For-S8 for MAs 7, 10, and 11: Silvicultural treatments available to achieve a</li></ul>												

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p>desired structure include: Uneven-aged management, (single-tree selection and group selection), WFU for resource benefits, PF, commercial thinning, precommercial thinning, salvage, and sanitation cutting.</p> <p>Guidelines –</p> <ul style="list-style-type: none"> <li>For-G3 for MAs 7, 10, and 11: As much as possible, within the context of maintaining structural stages at HRV levels, manage riparian zones to provide connectivity corridors between late/old structure stands. (Eastside Screens, CMP)</li> </ul>
	<b>Management direction specific to individual management areas</b>
	<p>The project area includes 9 Management Areas (MA) as described in the Wallow Whitman NF forest plan (starting pg. 4-56). Timber Production Emphasis (MA-1) makes up approximately 28,256 acres of the project area. Wildlife/Timber (MA 3) includes another 36,068 acres. Outside the HCNRA, Wild and Scenic Rivers (MA 7), Research Natural Areas (MA 12) and Old Growth Preservation (MA 15) comprise approximately 6,350 acres. The remaining 3 management areas within the project areas (approximately 28,735 acres) are within the HCNRA as described in the CMP (Appendix C, Table C1) and consist of HCNRA Dispersed Recreation/Native Vegetation (MA 9), HCNRA Forage Production (MA 10) and HCNRA Dispersed Recreation/Timber Management (MA 11).</p>
	<p>MA 1 – Timber Production Emphasis.</p> <ul style="list-style-type: none"> <li>Timber. Use timber management to convert unmanaged natural stands to vigorous managed stands.</li> <li>Insects and Diseases. Prevent and/or suppress insects and diseases using integrated pest management techniques when outbreaks threaten resource management objectives. Activities might include stump treatment for root rots, application of pesticides for defoliators and cone insects, early harvest, stocking control, and species control. The most cost-effective strategy may be no action, which will be considered in project analyses.</li> </ul>
	<p>MA 3 – Wildlife/Timber.</p> <ul style="list-style-type: none"> <li>Timber. Timber management will be similar to that of Management Area 1 but constrained to meet wildlife objectives. Where it is determined through project-level environmental analysis that use of uneven-aged management methods are practical, and better meet the objectives of Management Area 3, these methods may be used.</li> <li>Insects and Diseases. Apply standards and guidelines from Management Area 1.</li> </ul>
	<p>MA 9 – HCNRA Dispersed Recreation/Native Vegetation.</p> <ul style="list-style-type: none"> <li>In these areas, all activities will be managed to provide many opportunities for dispersed recreation and to enhance native vegetation. It is envisioned that these areas will eventually be almost entirely occupied by native plant species.</li> </ul>
	<p>MA 10 - HCNRA Forage Emphasis.</p> <ul style="list-style-type: none"> <li>This management area lies within the grasslands interwoven with timbered stringers in the HCNRA. Timbered portions will provide old-growth habitat at approximately current levels.</li> </ul>
	<p>MA 11 - HCNRA Dispersed Recreation/Timber Management.</p> <ul style="list-style-type: none"> <li>These areas combine dispersed recreation with timber management on the more productive sites within the HCNRA. The management objective is to provide a variety of tree species, a diversity of healthy timber stands, and ample dispersed recreation opportunities.</li> </ul>
	MA 15 – Old Growth Preservation.

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<ul style="list-style-type: none"> <li>• Timber. Areas allocated to old-growth timber will have no scheduled timber harvest although salvage may occur following catastrophic destruction if a more suitable replacement stand exists.</li> <li>• Insects and Diseases. Control of pests is encouraged where pests threaten destruction of an old-growth stand. Where destruction of the old-growth is not likely, artificial control of pests will occur only when this can be accomplished without adverse effects on old-growth values.</li> </ul>
<b><u>Soils</u></b>	All of the Lower Joseph Creek Restoration Project alternatives are consistent with the Wallowa-Whitman Land and Resource Management Plan, the Forest Service Manual 2500, the National Forest Management Act of 1976, and the Hells Canyon NRA Comprehensive Management Plan (HCNRA CMP, 1996) as detailed below, with the exception of 3 soils inventories in the CMP that have not taken place (validate w/WW&HCNRA).
	<b>Soils - Forest-wide standards and guidelines</b>
<b>Soils (FP 4-21)</b>	<ul style="list-style-type: none"> <li>• Conflicts with Other Uses - Give maintenance of soil productivity and stability priority over uses described or implied in all other management direction, standards, or guidelines.</li> <li>• Protection - Detrimental soil conditions are to be minimized with total acreage detrimentally impacted not to exceed 20 percent of the total acreage within the activity area including landings and system roads. Where detrimental conditions affect 20 percent or more of the activity area, restoration treatments will be considered.</li> <li>• Protection - Re-establish vegetation following management activities where necessary to prevent excessive erosion.</li> </ul>
	<b>Soils - Hells Canyon NRA Comprehensive Management Plan – Objectives, Standards and Guidelines (Appendix C, Table C1)</b>
<b>Soils (C-80 to 84)</b>	<p>Objectives –</p> <ul style="list-style-type: none"> <li>• Soi-O1: Manage soil surface conditions consistent with late-seral status depending on the potential natural condition (PNC)...and develop appropriate soil improvement objectives, where needed.</li> <li>• Soi-O2: Complete a watershed improvement needs inventory for the HCNRA that includes soil resource improvement needs.</li> <li>• Soi-O3: Complete an Order 2/3 ecological inventory and Order 4 land systems inventory of HCNRA to provide basic soils information for evaluation of management activities.</li> <li>• Soi-O4: Identify and characterize unique soils that are a necessary part of the habitat for federally listed TES species, biologically unique and rare combinations of outstanding and diverse ecosystems.</li> </ul> <p>Standards –</p> <ul style="list-style-type: none"> <li>• Soi-S1: Identify and evaluate adverse impacts to soil productivity and soil stability.</li> </ul> <p>Guidelines –</p> <ul style="list-style-type: none"> <li>• Soi-G1: Use soil information to evaluate soil characteristics, potentials and limitations, effects on soils, and protection, rehabilitation and monitoring needs when implementing management activities that will disturb soil or vegetation resources.</li> <li>• Soi-G2: Consider using the following methods to achieve soil quality objectives for activities involving ground-based equipment use: <ul style="list-style-type: none"> <li>▪ Restrict equipment use to slopes under 30% gradient.</li> </ul> </li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<ul style="list-style-type: none"> <li>▪ Restrict equipment use to periods of favorable soil moisture levels (i.e. when soils are dry, or the ground is frozen to at least a 4" depth, or snow depth is at least two feet).</li> <li>▪ Designate landing and skid trail locations.</li> <li>▪ Use full or partial suspension log yarding, where practical and mechanically feasible, to minimize ground disturbance.</li> <li>• Soi-G3: Consider using the following methods to achieve soil quality: <ul style="list-style-type: none"> <li>▪ Restore damaged soils to as near pre-impact conditions as possible, where appropriate and practical.</li> <li>▪ Use native species when re-establishing vegetative ground cover following wildfire or management activities.</li> <li>▪ Keep erosion control work current, when required; plan to complete all work prior to the first major rainfall event or snowfall event that would prevent achievement of project objectives.</li> </ul> </li> <li>• Soi-G4: Maintain the appropriate quantity and distribution of fine organic matter (&lt;3" diameter) and coarse woody material (&gt;3" diameter) necessary to control erosion and to maintain nutrient recycling for long-term soil productivity.</li> </ul>
<b><u>Diversity - Plant Community</u></b>	
	<b>Diversity - Forest-Wide Standards and Guidelines</b>
<b>Diversity(FP 4-30)</b>	<ul style="list-style-type: none"> <li>• Project Analysis - Develop, during project planning, site-specific management prescriptions with goals for diversity and ecosystem function.</li> <li>• Vegetation Manipulation - Provide and maintain an ecologically sound distribution and abundance of plant and animal communities and species at the forest stand, basin, and Forest level. This distribution should contribute to the goal of maintaining all native and desirable introduced species and communities.</li> <li>• Vegetation Manipulation - Allow for all natural species to function following vegetation manipulation. None should be eliminated from the site.</li> </ul>
	Management direction specific to individual management areas
	MA 3 – Wildlife/Timber. Fire. Favor prescribed fire slash treatment methods when feasible prescribed fire from planned or unplanned ignitions will be used to achieve winter range management objectives, and maintain diversity within plant communities
<b><u>Threatened, endangered, and sensitive species</u></b>	
	<b>TES - Forest-Wide Standards and Guidelines</b>
<b>Threatened, endangered, and sensitive species (FP 4-30, 31)</b>	<ul style="list-style-type: none"> <li>• Reviews/Biological Evaluations - Review all actions and programs, authorized, funded, or carried out by the Forest Service, to determine their potential effects on threatened, endangered, and sensitive species. Conduct these reviews, including biological evaluations, per direction in FSM 2670 and appropriate R-6 manual supplements.</li> <li>• Reviews/Biological Evaluations - Prepare a biological evaluation during the environmental analysis of each project to determine possible effects of the proposed activity on threatened, endangered, and sensitive species.</li> <li>• Other Activities - Restrict or prohibit other activities (e.g., off road vehicles impacting plants or habitats) and monitor activities where necessary to protect threatened, endangered, or sensitive species.</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<ul style="list-style-type: none"> <li>• Cooperation With Other Agencies - Cooperate with the US Fish and Wildlife Service, the States of Oregon, Washington, and Idaho in the development and implementation of recovery plans for threatened and endangered species. When such plans conflict with other management direction, the recovery plans will take precedence.</li> <li>• Monitoring - Monitor known populations of sensitive species and their habitats in accordance with the Forest Monitoring Plan.</li> </ul>
	<b>TES - Hells Canyon NRA Comprehensive Management Plan – Objectives, Standards and Guidelines (Appendix C, Table C1)</b>
<b>Rare and Endemic Plant Species (C-88 to 89)</b>	<p>Standards –</p> <ul style="list-style-type: none"> <li>• Bio-S1: During project-level planning, to the extent feasible, survey and document the location of populations of rare and endemic plant species, rare combinations of outstanding and diverse ecosystems and parts associated therewith; and rare combinations of aquatic, terrestrial, and atmospheric habitats. Consider the effects of proposed projects on populations of rare and endemic plant species, rare combinations of outstanding and diverse ecosystems and parts associated therewith; and rare combinations of aquatic, terrestrial, and atmospheric habitats. Prescribe mitigation and protection for populations of rare and endemic plant species, rare combinations of outstanding and diverse ecosystems and parts associated therewith; and rare combinations of aquatic, terrestrial, and atmospheric habitats.</li> </ul> <p><i>Refer to Appendix G – Detailed Vegetative Data for the criteria and a listing of rare and endemic plant species, rare combinations of outstanding and diverse ecosystems and parts associated therewith; and rare combinations of aquatic, terrestrial, and atmospheric habitats.</i></p>
<b>Threatened, Endangered, and Sensitive Plant Species (C-90 to 91)</b>	<p>Objectives –</p> <ul style="list-style-type: none"> <li>• TES-O1: Manage habitat and populations of federally listed threatened, endangered or proposed plant species to ensure their continued existence and recovery in the HCNRA. Ensure that ongoing and new management actions do not jeopardize federally listed threatened, endangered or proposed plant species. Implement restoration and recovery activities that would facilitate removal of species from the federal threatened and endangered species list. (Forest Plan, FSM 2670)</li> <li>• TES-O2: Manage habitat and populations of all FS sensitive plant species to ensure their continued existence and viability in the HCNRA. Ensure that all actions do not contribute to the species becoming federally listed threatened and endangered under the ESA. (Forest Plan, FSM 2670)</li> <li>• TES-O3: Implement recovery plans for federally listed threatened, endangered or proposed plant species cooperatively with the USFWS. Contribute to revisions of recovery plans, and carry out recommended actions in recovery plans. (Forest Plan, FSM 2670)</li> <li>• TES-O4: Conduct habitat improvement projects for federally listed species. These may include fencing, burning, closing roads, treatment of noxious weeds, plant propagation, or other actions.</li> </ul>
<b>Threatened, Endangered, and Sensitive Plant Species (C-90 to 91)</b>	<p>Standards –</p> <ul style="list-style-type: none"> <li>• TES-S1: When evaluating ongoing and new actions, survey probable habitat for rare plants. Mitigate potential conflicts or modify the project to ensure the protection of rare plants and their associated habitat. (Forest Plan, FSM 2670)</li> <li>• TES-S2: Monitor population trends and habitat conditions for federally listed</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p>threatened, endangered or proposed plant species. (Forest Plan)</p> <ul style="list-style-type: none"> <li>• TES-S3: Manage habitat and populations of FS sensitive species consistent with conservation agreements or conservation strategies.</li> </ul>
<b><u>Invasive Species and Insects and Disease</u></b>	
	<b>Insects and Disease - Forest-Wide Standards and Guidelines</b>
<b>Insects and Disease (Pests) (FP 4-55)</b>	<ul style="list-style-type: none"> <li>• Integrated Pest Management - Use Integrated Pest Management (IPM) strategies for early detection, suppression and prevention of Forest pests and to manage pests within the constraints of laws and regulations IPM strategies include manual, mechanical, cultural, biological, chemical, prescribed fire, and regulatory means Strategy selection will be based on environmental analysis</li> <li>• Control of Noxious Weeds - Aggressively pursue control of identified noxious weeds on lands where such activities are not precluded by management area direction This will be accomplished through Forest activities and through coordination with county, State and other Federal agencies as funds permit.</li> <li>• Control of Noxious Weeds - When the need to control noxious weeds or competing vegetation is identified, the selection of any particular treatment method will be made at the project level based on a site specific analysis of the relative effectiveness, environmental effects (including human health), and costs of the feasible alternatives. Herbicides will be selected only if their use is essential to meet management objectives.</li> <li>• Control of Noxious Weeds - Cooperate with the Animal and Plant Health Inspection Service (APHIS) in accord with the Memorandum of Understanding between APHIS and the USDA Forest Service.</li> <li>• Monitoring - Develop monitoring and enforcement plans for site-specific projects as described in the environmental analyses for these projects.</li> </ul>
	<b>Noxious Weeds - Hells Canyon NRA Comprehensive Management Plan – Objectives, Standards and Guidelines (Appendix C, Table C1)</b>
<b>Noxious Weeds, Invasive Plants and Nonnative Plants (C-66 to 68)</b>	<p>Objectives –</p> <ul style="list-style-type: none"> <li>• Nox-O1: Manage noxious weeds to reduce negative impacts to native plants, wildlife, and other resources. Use all reasonable and feasible integrated weed management processes available under existing decisions and direction to prevent, restore, eradicate, control, contain, or otherwise reduce negative impacts of noxious weeds.</li> <li>• Nox-O2: Evaluate extent of nonnative invasive plants, their relative impacts and potential for restoration.</li> </ul> <p>Guidelines –</p> <ul style="list-style-type: none"> <li>• Nox-G1: Conduct restoration activities on grassland sites in midseral or earlier status to improve the ability of native vegetation on site to resist invasion and occupancy by noxious weeds.</li> <li>• Nox-G2: Develop a public information and education program on preventing the introduction and spread of noxious weeds. Provide a reporting method for and encourage the public to report new weed sites.</li> <li>• Nox-G3: Provide for natural restoration of degraded sites by modifying management activities as necessary.</li> <li>• Nox-G6: When planning PF projects, identify sites of known noxious weeds and/or invasive species of concern. Avoid burning through identified weed sites and/or prescribe management actions that will minimize the potential for</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p>creation of site conditions favorable to the spread of invasive weeds.</p> <ul style="list-style-type: none"> <li>• Nox-G7: Contain and/or control aggressive noxious weeds and other nonnative plants that reduce ground cover, reduce perennial plant cover, and accelerate erosion.</li> </ul>
<b><u>Watershed</u></b>	
	<b>Watershed - Hells Canyon NRA Comprehensive Management Plan – Objectives, Standards and Guidelines (Appendix C, Table C1)</b>
<b>Riparian/Aquatic Habitat and Water Quality (C-121 to 122)</b>	<p>Standards –</p> <ul style="list-style-type: none"> <li>• Wqq-S1: Meet or exceed state water quality standards for waters of the States of Idaho and Oregon within the HCNRA, including total maximum daily loads (TMDLs).</li> <li>• Wqq-S2: Implement water quality improvement standards and guidelines for water quality impaired waters of the States of Idaho and Oregon within HCNRA, as required in state Water Quality Management Plans (WQMPs).</li> <li>• Wqq-S3: Develop Water Quality Restoration Plans (WQRPs) for water quality impaired waters within HCNRA, as described in Protocol for addressing Clean Water Act section 303(d) listed waters. Version 2.0, as updated (USDA and USDI 1999).</li> </ul> <p>Guidelines –</p> <ul style="list-style-type: none"> <li>• Wqq-G1: Cooperate with the States of Idaho and Oregon to develop TMDLs for streams in HCNRA on State 303(d) Lists.</li> <li>• Wqq-G2: Cooperate with the States of Idaho and Oregon to develop WQMPs for subbasins in HCNRA, including Brownlee Reservoir, Hells Canyon, Imnaha, Lower Snake-Asotin, Lower Grande Ronde, Little Salmon, and Lower Salmon subbasins.</li> <li>• Wqq-G3: When developing TMDLs, WQMPs and WQRPs, evaluate the relationship between water quantity and water quality, and develop appropriate solutions, where needed.</li> </ul>
<b>Aquatic Habitat</b>	The Forest Plan water temperature standards are to meet state water quality standards and prevent measurable increases in water temperature (1990 Forest Plan, 1995 PACFISH Amendment), and maintain maximum water temperatures below 64°F within migration and rearing habitat and below 60°F within spawning habitats (PACFISH).
	<b>Watershed - Forest-Wide Standards and Guidelines</b>
<b>Watershed (FP 4-22, 23)</b>	<ul style="list-style-type: none"> <li>• Water Quality Standards and BMP's. Meet Water Quality Standards for waters of the States of Oregon (Oregon Administrative Rules, Chapter 340-41) and Idaho through planning, application, and monitoring of Best Management Practices (BMP's) in conformance with the Clean Water Act, regulations, and federal guidance issued thereto.</li> <li>• Stream Temperatures. Prevent measurable temperature increases in Class I Streams (less than a 0.5 degree Fahrenheit change). Temperature increases on SMU Class II (and fishbearing Stream Management Unit Class III) streams will be limited to the criteria in State standards. Temperatures on other streams may be increased only to the extent that water quality goals on downstream, fish-bearing streams will still be met. Normally, stream shade management on Class III streams will differ little from treatment on Class II streams</li> </ul>
	In addition to meeting the Forest Plan standard, the Forest must meet Oregon water quality standards under the Clean Water Act. EPA approved new water quality standards for Oregon in March 2004. Streams in the aquatic effects are considered “salmon and trout rearing and migration habitat” for Oregon water temperature

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p>standards. For the aquatic effects area, the following water temperature standard applies:</p> <ul style="list-style-type: none"> <li>The seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use on subbasin maps set out at OAR 340-041-0101 to 340-041-0340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit).</li> </ul>
<b><u>Wildlife</u></b>	The Lower Joseph project is consistent with the Forest Plan (1990) including the 1995 Regional Forester's Eastside Forest Plan Amendment #2. In addition to meeting standards and guidelines for water quality (see effects to aquatic habitat discussion), the proposed activities are consistent with all Forest Plan Wildlife standards and guidelines including.
	<b>Wildlife - Forest-Wide Standards and Guidelines</b>
<b>Diversity (FP 4-30)</b>	<ul style="list-style-type: none"> <li>Goal - To protect and, manage habitat for the perpetuation and recovery of plants and animals which are listed threatened, endangered, or sensitive. (A list of these species can be found in the Forest Plan EIS.) To assure that management activities do not jeopardize the continued existence of sensitive species or results in adverse modification of their essential habitat.</li> </ul>
<b>Threatened, Endangered and Sensitive Species (FP 4-30, 31)</b>	<ul style="list-style-type: none"> <li>Reviews/Biological Evaluations - Review all actions and programs, authorized, funded, or carried out by the Forest Service, to determine their potential effects on threatened, endangered and sensitive species. Conduct these reviews, including biological evaluations, per direction in FSM 2670 and appropriate R-6 manual supplements.</li> </ul>
<b>Wildlife (FP 4-44, 45 , 46)</b>	<ul style="list-style-type: none"> <li>Riparian and Old Growth - Manage riparian and old growth habitat consistent with Forest Service Manuals 2500 and 2600. Where natural stream characteristics permit, the management, (as described in <i>Managing Riparian Ecosystems (Zones) for Fish and Wildlife in Eastern Oregon and Eastern Washington</i>), would provide for 60-100 percent shade on live streams, 80 percent or more total lineal distance of streambank in stable condition, limiting fine inorganic sediment covering stream substrate to 15 percent, and 80 percent or more of the potential grass-forb, shrub and tree cover. Maintain old growth to meet old growth wildlife species needs.</li> <li>Riparian - Give preferential consideration to resources such as fish, certain wildlife and vegetation, and water which are dependent upon riparian areas over other resources in actions within or affecting riparian areas.</li> <li>Riparian - Manage timber stands in riparian areas to provide habitat for snag-dependent wildlife species at not less than 60 percent level of the optimum habitat, (including snags of all sizes), as described in <i>Wildlife Habitats in Managed Forests</i> (Thomas, 1979).</li> <li>Snag Management - Maintain at least the 20 percent level (the management requirement level) of snags 10 to 20 inches in diameter wherever higher levels are not specified and where doing so would not conflict with the primary management area objective. Exceptions include: <ul style="list-style-type: none"> <li>Management Area 16 (Administrative and Recreation Sites).</li> <li>Management Area 17 (Utility Corridors) if use of the corridor for its designated purpose requires clearing of vegetation.</li> <li>Areas where catastrophic mortality such as from fire, disease, or insect epidemic precludes the leaving of green replacement trees</li> <li>Areas where harvest is occurring to treat an insect or disease situation and leaving green replacement trees would significantly</li> </ul> </li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p>reduce the effectiveness of the treatment.</p> <ul style="list-style-type: none"> <li>• Dead and Down Material - Provide dead and down woody material to meet habitat requirements for those species of wildlife, insects, fungi, and other microscopic plant and animal species associated with this type of habitat. Actions to provide this habitat may include such things as leaving one or more concentrations of slash per acre for small mammals and ground-nesting birds, leaving unmerchantable logs on-site in various stages of decay, and activities needed to protect this debris to prescribed fire and fuel wood cutting.</li> <li>• Raptor Nest Sites - Protect all raptor nest sites in use. Protect other nesting sites, important roosting, or special foraging habitats where it can be accomplished without adversely affecting long-term timber production or unreasonably complicating timber sale preparation and related activities. Such means could include adjustments in unit boundaries, operating seasons, or harvest scheduling.</li> <li>• Unique Habitats - Avoid alteration of unique habitats such as cliffs and talus slopes. Decisions to alter or disturb these habitats would only be made following site-specific NEPA analysis including identification of suitable mitigation measures. Springs are also considered unique habitats.</li> <li>• Indian Treaty Rights - Recognize the hunting and fishing rights of the Indian tribes in habitat management activities.</li> </ul>
<b>Insects and Disease (Pests) (FP 4-55)</b>	<ul style="list-style-type: none"> <li>• Integrated Pest Management - Use Integrated Pest Management (IPM) strategies for early detection, suppression and prevention of Forest pests and to manage pests within the constraints of laws and regulations IPM strategies include manual, mechanical, cultural, biological, chemical, prescribed fire, and regulatory means. Strategy selection will be based on environmental analysis</li> </ul>
<b>Regional Forester's Eastside Forest Plan Amendment #2</b>	<p>Ecosystems Standards (Screen 2). 2A the following are not subject to the Ecosystem Standards, Historical Range of Variability (HRV) analysis, but <b>MUST APPLY</b> Wildlife Standards:</p> <ol style="list-style-type: none"> <li>1) Pre-commercial thinning sales;</li> <li>2) sales of material sold as fiber;</li> <li>3) sales of dead material less than 7-inches dbh, with incidental green volume, (reference RO 2430 letter, 8/16/93);</li> <li>4) salvage sales, with incidental green volume, located outside currently mapped old-growth (reference letter RO 2430, 8/16/93).</li> <li>5) commercial thinning and understory removal sales located outside currently mapped old-growth.</li> </ol>
	<p>Wildlife Standards (Screen 3) Scenario A: If either One or BOTH of the LOS FALLS BELOW HRV in a particular biophysical environment. <b>DO NOT ALLOW</b> timber sale harvest activities to occur within LOS stages that are below HRV.</p>
	<p>3) a) Maintain connectivity and reduce fragmentation of LOS stands by adhering to the following standards:</p> <ol style="list-style-type: none"> <li>1) Connect these LOS and old-growth habitats with each other in contiguous network pattern by at least two different directions;</li> <li>2) A connectivity corridor stand is one which medium diameter of larger trees are common, canopy closures are within the top 1/3 of site potential, stand width is at least 400 foot wide at the narrowest point;</li> <li>3) Connectivity corridors should be as short as possible;</li> <li>4) Harvesting within connectivity corridors is permitted if all criteria in (2) above can be met.</li> </ol>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	b) Reduce fragmentation of LOS stands, or at least, do not increase it from current 1 levels. Stands that do not currently meet LOS that are located within, or surrounded by, blocks of LOS stands should not be considered for even-aged regeneration, or group selection at this time.
	<b>Wildlife - Hells Canyon NRA Comprehensive Management Plan – Objectives, Standards and Guidelines (Appendix C, Table C1)</b>
	<ul style="list-style-type: none"> <li>• Forested areas in the HCNRA provide late/old structure (25%) for forest-associated species. The HCNRA will be managed as a healthy ecosystem that is an integral component of a larger bioregion. Managing for all structural stages, including late/old, will achieve functional old-growth habitat for associated species.</li> <li>• The decision establishes objectives to protect and maintain wildlife habitat.</li> </ul>
<b>Wildlife Habitat (C-127 to 131)</b>	<p>Standards –</p> <ul style="list-style-type: none"> <li>• WLD-S1: Administer HCNRA for public outdoor recreation in a manner compatible with the protection and maintenance of wildlife habitat and populations. (New)</li> <li>• WLD-S2: Protect, enhance, and manage wildlife habitat for the recovery of wildlife that are federally listed as threatened, endangered, or sensitive. Inventory the occurrence and distribution of threatened and endangered species. (Forest Plan)</li> <li>• WLD-S3: Locate, monitor, and protect nesting, roosting, and feeding areas for bald eagles. Develop nest site plans for new nests within two years of discovery. (New)</li> <li>• WLD-S4: Protect Townsend’s big-eared bats from negative human-caused disturbance by managing access at the entrances of caves and mines. (Forest Plan)</li> <li>• WLD-S5: Identify and map late/old structure in MAs 7, 10, and 11 and track its extent and distribution through time. Identify and maintain connectivity between late/old structure. Refer to Table C-10: Interim Definitions for Old Growth (Region 6). (New)</li> <li>• WLD-S6: In MAs 7, 10 and 11, identify late/old structure replacement stands and develop a management strategy (during project-level planning) to maintain or move stands toward late/old structure conditions as needed to maintain this component within the HRV. (New)</li> <li>• WLD-S7: Maintain open-road densities for all 61 subwatersheds at or below 1.35 mi./sq. mi., except subwatershed 9L, which would be maintained at or below 1.9 mi./sq. mi. open road densities. (New)</li> <li>• WLD-S8: Prevent the spread of diseases from domestic sheep to wild sheep by maintaining separation of the two species. Vacant allotments would not be stocked with domestic sheep unless a vaccine or other technique is found that eliminates the incompatibility. (New)</li> </ul> <p>Guidelines –</p> <ul style="list-style-type: none"> <li>• WLD-G1: Build and manage gates for Townsend’s big-eared bats at the entrance of each cave or mine tunnel that is negatively affected by human-caused disturbance. Gates will be set back to comply with visual concerns. (New)</li> <li>• WLD-G2: Cave and mine shafts used for hibernation should be identified and protected from human-caused disturbance from November 1 to April 1, each year. (New)</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<ul style="list-style-type: none"> <li>• WLD-G3: Maternity colonies for Townsend's big-eared bats should be identified and protected from human-caused disturbance from May 1 to August 15. (New)</li> <li>• WLD-G4: Known habitat areas for Townsend's big-eared bats should contain buffers of uninterrupted canopy (brush or trees) of 100 feet, where possible. (New)</li> <li>• WLD-G5: Outside Wilderness, maintain a diversity of wildlife habitats by providing a variety of structural stages for each plant association arranged in a mosaic across the landscape. (New)</li> <li>• WLD-G6: Identify and monitor potential wolverine natal den sites. If active natal den sites are found, restrict human use near these sites from January through May. (New)</li> <li>• WLD-G7: Maintain large refugia (greater than 10,000 acres) with low human-caused disturbance for wolverine, fisher, pine marten, lynx, wolf, and other forest carnivores benefitting from large undisturbed areas. (New)</li> <li>• WLD-G8: Identify blocks of late/old structure at least 900 acres each to provide habitat for associated species (Bull and Holthausen 1993). (New) (Typo: WLD-G9 page C-129 in Appendix C HCNRA CMP)</li> <li>• WLD-G9: Maintain elk and deer habitat to meet the current management objective levels, unless adjusted by the Oregon Fish and Wildlife Commission. Work cooperatively with ODFW on future management objective revisions. The current management objective are (ODFW 1994): (New) <ul style="list-style-type: none"> <li>○ Snake River: 4,200 elk, 15 bulls, 40 calves; 6,400 deer, 15 bucks, 70 fawns</li> <li>○ Pine Creek: 400 elk, 15 bulls, 45 calves; 2,500 deer, 15 bucks, 70 fawns</li> <li>○ Chesnimnus: 3,500 elk, 10 bulls, 40 calves; 3,600 deer, 15 bucks, 70 fawns</li> <li>○ Imnaha: 800 elk, 15 bulls, 40 calves; 5,300 deer, 15 bucks, 70 fawns (bull, calves, bucks, fawns are per 100 cows/does).</li> </ul> </li> <li>• WLD-G10: Outside Wilderness, actively manage habitat for big-game herds to assist the States of Oregon and Idaho and the Nez Perce Tribe in reaching population objectives, bull and buck escapement, and calf and fawn ratios. Continue to recover bighorn sheep through participation with the restoration of Bighorn Sheep to Hells Canyon, the Hells Canyon Initiative (Hells Canyon Bighorn Sheep Restoration Committee 1997). (New)</li> <li>• WLD-G11: Ensure the long-term maintenance of healthy populations of native landbirds by implementing the biological objectives in the Landbird Conservation Strategy (Partners in Flight 2000 as updated). (New) (Typo: WLD-G8 page C-131 in Appendix C HCNRA CMP)</li> <li>• WLD-G12: Evaluate, and where appropriate, re-establish, and/or enhance populations of indigenous wildlife species. The appropriate mechanism is to reach joint agreement, through an MOU with the appropriate fish and wildlife state agencies. (New)</li> <li>• WLD-G13: Manage recreational livestock use to minimize the potential for transmission of harmful domestic animal diseases to wildlife. (New)</li> </ul>
<b>Heritage</b>	
	<b>Heritage - Forest-Wide Standards and Guidelines</b>
<b>Cultural Resources (FP 4-</b>	<ul style="list-style-type: none"> <li>• Overview - Maintain a Forest-wide cultural resources overview that</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
<b>19, 20)</b>	<p>summarizes and compiles known cultural resource information. <i>The Cultural Resources Overview of the Malheur, Umatilla, and Wallowa Whitman National Forests in Northeast Oregon/ Southeast Washington, Volumes I and II (1978) are on file in the cultural resources office in Joseph and Baker City, Oregon. These documents were consulted as a standard part of the cultural resources inventory for this undertaking.</i></p> <ul style="list-style-type: none"> <li>• Evaluation - Evaluate cultural resources that may be affected by project activities. Evaluate against the criteria for eligibility to the National Register of Historic Places. Develop a plan to evaluate all other cultural resources by theme groups, agreements, or other cost-effective means as Forest-wide inventory nears completion (see also HCNRA CMP Items Her-S4 and S4, and River Plan item 54).</li> <li>• Protection - Protect eligible cultural resources from human depredation and natural destruction. Protection plans may include physical protection such as fences and barriers, scientific study and collection, patrol and site monitoring, proper use or removal of signs, maintaining site anonymity, and gaining public understanding and support through education (see also HCNRA CMP Item Her-O1).</li> </ul>
<b>Scenic Quality</b>	
<b>Landscape Management (FP 4-42)</b>	Goal: Landscape Management: To manage all National Forest lands to obtain the highest possible visual quality, commensurate with other appropriate public uses, cost and benefits.
	<b>Scenic Quality - Forest-Wide Standards and Guidelines</b>
<b>Landscape Management (FP 4-42, 43, 44)</b>	<ul style="list-style-type: none"> <li>• VQO's -Meet visual quality objective through management techniques described in National Forest Landscape Management, Volumes 1 and 2, and the Wallowa-Whitman National Forest Visual Management Plan.</li> <li>• Retention Foreground -In retention foregrounds the area regenerated per decade should not exceed 7 percent or be less than 3 percent of the suitable forest land within the viewshed. Maximum seen area disturbed at any one time should not exceed 10 percent within any viewshed. Limit regeneration unit size to that which meets retention and desired character including consideration of future entries and regrowth. The approximate range of sizes necessary to accomplish this is ½ to 2 acres in the immediate foreground (less than 500 feet) and 3 to 5 acres in the foreground greater than 500 feet from the road or trail. Units against road or trail edges should be shelterwoods or selection cuts rather than clearcuts. Target tree size is 36 inches where biologically feasible.</li> <li>• Partial Retention Foreground and Retention Middleground -In partial retention foreground and retention middleground, the area regenerated per decade should not exceed 9 percent or be less than 5 percent of the suitable forest land within and viewshed. The maximum seen area disturbed at any one time should not exceed 14 percent of any viewshed. Limit regeneration unit size to that which meets partial retention and desired character including consideration of future entries and regrowth. The approximate range of sizes necessary to accomplish this is ½ to 2 acres in the immediate foreground (less than 500 feet) and 3 to 5 acres in the foreground greater than 500 feet from the road or trail. Target size tree in foreground is 26 inches where biologically feasible.</li> <li>• Partial Retention Middleground - In partial retention middleground, the area regenerated per decade should range between 8 and 10 percent. Limit maximum regeneration unit size to 10 acres. Maximum area disturbed at any one time should not exceed 20 percent.</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>										
	<ul style="list-style-type: none"> <li>Created Openings - Consider a created opening to no longer be an opening, visually, when trees reach 20 feet in height. Rotation periods will be sufficient to grow large tree character in viewshed foregrounds.</li> <li>Resolving Conflicts - Where conflicts develop between visual quality objectives and timber or range management objectives, these conflicts will be resolved in favor of meeting the visual objectives. Where conflicts occur between old-growth objectives and visual objectives, old –growth will have priority.</li> <li>Viewshed Plans – Plans will be prepared for all Level 1 viewsheds that will refine boundaries, establish protect design criteria, and identify opportunities for scenic enhancement, and set entry priorities and timing.</li> </ul>										
	<b>Scenery - Hells Canyon NRA Comprehensive Management Plan – Objectives, Standards and Guidelines (Appendix C, Table C1)</b>										
	The following would replace existing CMP management objectives (page 30) and supplement Forest Plan management direction (pages 4-42 through 4-44):										
<b>Scenery (C-18 to 19)</b>	<p>Objectives -</p> <ul style="list-style-type: none"> <li>Sce-O1: Manage to meet landscape character goals that conserve and preserve valued landscape character attributes and elements of scenic attractiveness through the planning period.</li> <li>Sce-O2: Use constituent information surveys to gather information from constituents to define desired landscape character at various levels of landscape scale. Use survey information to determine social values and consider in conjunction with other resource data to determine appropriate management strategies throughout the planning period.</li> <li>Sce-O3: In developing management strategies, through the planning period, integrate social values and bio/physical considerations to maintain or improve a sustainable desired landscape character. Utilize mitigation measures and design techniques to reduce effects (short term and long term, direct and indirect) to landscape aesthetics.</li> <li>Sce-O4: Inventory areas and site-specific locations where alterations deviate from desired landscape character. Evaluate and prioritize efforts to restore and/or rehabilitate.</li> </ul> <p>Standards –</p> <ul style="list-style-type: none"> <li>Sce-S1: Manage vegetation to achieve ecological integrity levels that sustain desired landscape character and in manner compatible with scenic integrity levels. Refer to Table C-3a and C-3b: Recreation Management Direction by alternative for scenic integrity objectives.</li> </ul> <p>Guidelines –</p> <ul style="list-style-type: none"> <li>Sce-G2: Consider the acceptable level of alteration when implementing site-specific projects and management strategies, using the rating aspects of scenic impact to landscape character described in Table C-4: Criteria for Rating Human-caused Impacts to Landscape Character. (In environmental consequences section)</li> <li>Sce-G4: Consider the acceptable level of alteration when implementing management strategies; using the following scenic integrity objectives:             <table border="0"> <tr> <td>○ Very high</td><td>Less than 1% impact</td></tr> <tr> <td>○ High</td><td>Less than 5% impact</td></tr> <tr> <td>○ Moderate High</td><td>Less than 10% impact</td></tr> <tr> <td>○ Moderate Low</td><td>Less than 15% impact</td></tr> <tr> <td>○ Low</td><td>Less than 20% impact</td></tr> </table> </li> </ul>	○ Very high	Less than 1% impact	○ High	Less than 5% impact	○ Moderate High	Less than 10% impact	○ Moderate Low	Less than 15% impact	○ Low	Less than 20% impact
○ Very high	Less than 1% impact										
○ High	Less than 5% impact										
○ Moderate High	Less than 10% impact										
○ Moderate Low	Less than 15% impact										
○ Low	Less than 20% impact										

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	○ Unacceptably Low      20% impact or more
<b>Wild and Scenic Rivers (C – 86)</b>	<p>Objectives –</p> <ul style="list-style-type: none"> <li>WSR-O3: Perpetuate forested stands within wild and scenic rivers in "scenic" and "recreational" designations to protect and enhance the river's outstandingly remarkable values and to ensure compatibility with the primary objectives of the HCNRA Act. (Public LURs)</li> </ul>
	<b>Wild and Scenic Rivers - Management Direction Specific to Individual Management Areas</b>
	<p>Management Area 7 (Wild and Scenic Rivers)</p> <p>Meet the visual quality objectives of preservation along wild river segments, retention along scenic segments, and partial retention along recreational river segments. Joseph Creek is designated a Wild River.</p>
	All other management areas in the LJCRP area that are not in the HCNRA Forestwide Standards and Guidelines for scenic quality apply
	<b>Management Area 9 – Dispersed Recreation/Native Vegetation:</b> Activities will be managed to provide ample opportunities for dispersed recreation and to enhance native vegetation. These areas will eventually be almost entirely occupied by native plant species. Range will be managed to maintain satisfactory range condition which will be achieved and maintained primarily by nonstructural means. These areas will provide a mix of primitive, semi-primitive non-motorized and semi-primitive motorized recreation opportunities. <i>Range of Partial Retention and Modification VQO's for all distance zones.</i>
	<b>Management Area 10 – Forage Emphasis:</b> This area lies within the grasslands interwoven with timbered stringers in the HCNRA. The grassland portions of these areas will be managed to provide maximum forage production with rangeland maintained in satisfactory condition (desired ecological status) and structural improvements being rustic in nature. Timbered portions will provide old-growth habitat at approximately current levels. These areas provide both semi-primitive motorized and semi-primitive nonmotorized opportunities. <i>Range of Partial Retention and Modification VQO's for all distance zones.</i>
	<b>Management Area 11 – Dispersed Recreation/Timber Management:</b> These areas combine dispersed recreation with timber management on the more productive sites within the HCNRA. The management objective is to provide a variety of tree species, a diversity of healthy timber stands, and ample dispersed recreation opportunities. These areas provide both semi-primitive motorized and semi-primitive nonmotorized opportunities. Timber volume removal from the HCNRA is classified as unregulated and does not contribute to the WWNF allowable sale quantity (Public LURS, USDA 1994). <i>Range of Partial Retention and Modification VQO's for all distance zones.</i>
<b>Recreation</b>	
	<b>Recreation - Forest-Wide Standards and Guidelines</b>
<b>Recreation (FP 4-40, 41, 42)</b>	<ul style="list-style-type: none"> <li>Winter Recreation - Develop and maintain opportunities for winter recreation where needed.</li> </ul> <p><i>There are no long term proposals to decrease winter recreation opportunities. Some short term opportunities may result with winter time hauling.</i></p> <ul style="list-style-type: none"> <li>Winter Recreation - Provide networks of marked groomed snowmobile routes through agreement with snowmobile clubs.</li> </ul> <p><i>Snowmobile trails have the potential to be impacted if a designated snowmobile route is plowed for winter haul. Coordination with the local snowmobile clubs may alleviate the concern if alternate temporary routes are groomed during the short</i></p>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p><i>term</i></p> <ul style="list-style-type: none"> <li>Recreation Site Development - Develop recreation sites, by ROS class, using the descriptions found in the Forest Plan Table 4-6.</li> </ul> <p><i>No changes are proposed that will modify the ROS classes at the developed sites.</i></p> <ul style="list-style-type: none"> <li>Outfitters and Guide - Outfitter guide activities may be considered within any management area, although outfitter camps will not be located within research natural areas.</li> </ul> <p><i>There are no outfitter and guides in the project area.</i></p> <ul style="list-style-type: none"> <li>Special Areas - Protect special places on the Wallowa-Whitman National Forest: e.g. dispersed recreation sites, water features, rock or unique landform features, areas of unique vegetation, historic sites, or other places which are special to Forest users commensurate with other Forest management Objectives.</li> </ul> <p><i>Special areas will protected be as part of the harvest activities and fuel treatments.</i></p> <ul style="list-style-type: none"> <li>Road, Trail, and Area Closures - Road, trail, and area closures and off-road vehicle use will be in accordance with the Forest Travel Management Plan and 36 CFR 295 This plan will be reviewed annually and revised as necessary, considering management needs and public desires.</li> </ul> <p><i>See Transportation System section for a discussion on the Forest Travel Management Plan</i></p>
	Hells Canyon NRA Comprehensive Management Plan – Objectives, Standards and Guidelines (Appendix C, Table C1)
<b>Over-snow Vehicle Travel (C-28)</b>	<p>Standards -</p> <ul style="list-style-type: none"> <li>Acc-S10: Manage for motorized over-snow vehicle travel on designated routes and areas.</li> <li>Acc-S12: Manage motorized over-snow vehicles on designated routes and play areas to maintain assigned ROS setting.</li> </ul> <p>Guidelines -</p> <ul style="list-style-type: none"> <li>Acc-G10: Through monitoring, identify necessary improvements to minimize user conflicts, and provide for acceptable levels of public safety.</li> </ul>
<b>Upland Outfitter and Guide Services (C-10 to 11)</b>	<p>Objectives –</p> <ul style="list-style-type: none"> <li>Rec-O5: Manage upland outfitter and guide services to provide quality recreation experiences consistent with HCNRA objectives and in the public interest. Minimize conflicts between users.</li> </ul> <p>Standards –</p> <ul style="list-style-type: none"> <li>Rec-S14: Manage outfitter and guide use in a manner that assures adequate opportunities for public use while providing commercial opportunities commensurate with demonstrated need.</li> </ul>
	<b>HCNRA CMP Recreation Management Direction (Appendix C, Table C-3b)</b>
<b>26 Cottonwood (C-173 to 174)</b>	<p>Objectives –</p> <ul style="list-style-type: none"> <li>Access - Maintain nonmotorized: trail access only, except for one mile for open road on the extreme northwest boundary of the RAA. Private.</li> <li>Remoteness - Manage for RN and SPM ROS designations. (RN occurs as a result of roads present in adjacent RAAs)</li> <li>Naturalness/Visual Quality - Manage for low scenic integrity.</li> <li>Social Encounters - Manage for RN and SPM ROS designations.</li> <li>Visitor Management - Manage for RN and SPM ROS designations.</li> <li>Visitor Impact - Manage for RN and SPM ROS designations.</li> <li>Facilities - There are no existing or proposed developments.</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
<b>27 Buckhorn/Cold Spring (C-174 to 175)</b>	<p>Access Objectives –</p> <ul style="list-style-type: none"> <li>• Manage Forest Road 46 for medium-level RN.</li> <li>• Manage the last 10 miles of Cold Springs Road (Forest Road 4680) for on the north end for high-level SPM.</li> </ul> <p>Access Standards –</p> <ul style="list-style-type: none"> <li>• Maintain Forest Road 4680 at Maintain Level 2-C.</li> <li>• Seasonally close approximately 5 miles of Teepee Butte (Forest Road 46-595) and approximately 7 miles of Wildhorse Road (Forest Road 46-596) at the junction with Forest road 46-595 and Forest Road 46-596 from 3 days prior to archery season to the end of antlerless elk season (late August through late November) to motorized vehicles. Post road closed with signs.</li> <li>• Emphasize grid-rolled surface on roads not managed as SPM and manage drainage on all roads</li> </ul> <p>Remoteness Objective –</p> <ul style="list-style-type: none"> <li>• Manage for RN, SPM, and SPNM ROS designations.</li> </ul> <p>Naturalness/Visual Quality Objective –</p> <ul style="list-style-type: none"> <li>• Manage for high scenic integrity</li> </ul> <p>Social Encounters Objective –</p> <ul style="list-style-type: none"> <li>• Manage for RN, SPM, and SPNM ROS designations.</li> </ul> <p>Social Encounters Standards –</p> <ul style="list-style-type: none"> <li>• Manage RN part of Forest Road 46 for moderate to high RN encounters. Manage RN part of Cold Springs Road (Forest Roads 4680) and Buckhorn Lookout Road (Forest Road 780 for lot to moderate RN encounters.</li> <li>• Manage SPM road encounters for moderate to high SPM encounters.</li> </ul> <p>Visitor Impact Objective –</p> <ul style="list-style-type: none"> <li>• Manage to RN, SPM, and SPNM ROS designations</li> </ul> <p>Facilities Objective –</p> <ul style="list-style-type: none"> <li>• Manage to RN, SPM, and SPNM ROS designations</li> </ul>
	<b>Recreation - Management Direction Specific to Individual Management Areas</b>
	<p>MA 1 – Timber Production Emphasis. Recreation. Recognize undeveloped campsites, hunter camps, or areas where concentrated recreation use occurs as being significant in producing and utilizing dispersed recreation opportunities. Prescriptions for timber harvesting, cleanup, site preparation, and thinning will consider the environmental setting that contributes to the attraction of these sites for recreation purposes. The attempt will be made to retain this attractive character during and after treatments. <i>(Harvest and operational prescriptions will be developed to retain the attractive characteristics of the dispersed sites during and after treatments)</i></p>
	<p>MA 3 – Wildlife/Timber. Recreation. Apply standards and guidelines from Management Area 1.</p>
	<p>MA 7 – Wild and Scenic Rivers. Recreation. Permit only primitive recreation developments within wild river segments. Primitive or nonprimitive development may occur along scenic segments, and recreational segments.</p>
	<p>MA 9 - HCNRA Dispersed Recreation/Native Vegetation Recreation. Provide recreation opportunities as described in the semi primitive motorized and semi primitive non-motorized, and primitive categories of the ROS</p>
	<p>MA 10 - HCNRA Forage Production Recreation. Provide both semi-primitive motorized and non-motorized</p>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	opportunities.
	MA11 - HCNRA Dispersed Recreation/Timber Management Recreation. Provide roaded natural recreation opportunities.
	MA 12 – Research Natural Area. Recreation. Manage these areas to accommodate recreational use similar to the management areas surrounding them.
	MA 15 – Old Growth Habitat Recreation. Roaded natural and roaded modified recreation opportunities will be provided <i>(The project does not propose any change to the Roaded Natural ROS class in MA 15 or other parts of the project area)</i>
	MA 16 – Administrative and Recreation Sites Provide roaded natural and rural recreation opportunities <i>(The project does not propose any change to the Roaded Natural ROS class in MA 16 or other parts of the project area)</i>
<b><u>Minerals</u></b>	<p>There are no approved Plans of Operations for mineral resources on National Forest system lands within the Lower Joseph Creek Restoration project analysis area at the time of writing (Appendix xx). The Hells Canyon National Recreation Area (HCNRA) Act of 1975 included the withdrawal of all future mineral development within the HCNRA. The proposed activities across all alternatives will not conflict with the General Mining Law of 1872, as amended; the Federal Land Policy and Management Act of 1976, as amended and the Surface Resources Act of 1955. The proposed activities across all alternatives are also consistent with the Goals and Standard and Guidelines defined in the Wallowa-Whitman Forest Plan (USDA Forest Plan, 1990) and outlined below.</p> <p>To provide for exploration, development, and production of a variety of minerals on the Forest in coordination with other resource objectives, environmental considerations and mining laws to encourage and assist, whenever possible, the continuation of regional geologic mapping and mineral resource studies on the forest in cooperation with other natural resource agencies.</p>
	<b>Minerals - Forest-Wide Standards and Guidelines</b>
<b>Minerals (FP 4-33, 34)</b>	<ul style="list-style-type: none"> <li>• Access - Permit claimants reasonable access to their claims as specified in United States Mining Laws.</li> <li>• Operating Plans – Require operating plans in accordance with 36 CFR 228 Subpart A. When operations are proposed which involve significant disturbance of the surface resources.</li> <li>• Operating Plans – Operating plans will include reasonable and operationally feasible requirements to minimize adverse environmental impacts on surface resources</li> <li>• Operating Plans – Analyze operating plan proposals and alternatives, including alternatives for access, reclamation, and mitigation, using the Forest Service NEPA process.</li> <li>• Reclamation – Develop reclamation standards using an interdisciplinary process to ensure lands are in productive condition to the extent reasonable and operationally feasible. Reasonable opportunities to enhance other resources will be considered. Concurrent reclamation will be stressed. Reclamation bonds will be based on actual reclamation costs and formulated using technical and other resource input.</li> <li>• Withdrawals – Review all existing withdrawals by 1991 in accord with Section 204(i) of the Federal Land Policy and Management Act (FLPMA) of 1976,</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p>except as provided otherwise by law.</p> <ul style="list-style-type: none"> <li>• Withdrawals – Recommend areas with minerals potential for mineral withdrawal only when mitigation measures would not adequately protect other resource values which are of greater public benefit.</li> <li>• Withdrawals – Conform with Section 204 of FLPMA in withdrawals from entry under general mining laws.</li> <li>• Common Minerals – Give priority to use of currently developed common mineral (natural gravel and hard rock) material sources over undeveloped sources. Exceptions will be made when existing sources are unable to economically supply the quality and quantity of material needed or when conflicts with other resource uses are found to be unacceptable.</li> <li>• Common Minerals – Development of mineral material sites will be done in accordance With 36 CFR 228, Subpart C</li> </ul>
<b><u>Range</u></b>	<p>Desired Condition To manage range vegetation and related resource in a manner insuring that the basic needs of the forage and browse plants and the soil resource are met. To make available for harvest, forage production that is in excess to the basic needs of the plants and soil resource, for wildlife (within agreed upon management objectives) and domestic livestock (within Forest Plan utilization standards) (Wallowa-Whitman LRMP 1992).</p>
	<b>Range - Forest-Wide Standards and Guidelines</b>
<b>Range (FP 4-51,52, 53, 54)</b>	<ul style="list-style-type: none"> <li>• Forage Allocation - Allocate forage resources on an allotment and/or management area specific basis to meet the basic plant and soils needs as the first priority. Forage production above that needed for basic resource needs may be allocated to wildlife (as provided for in agreed upon Management Objectives) and permitted livestock.</li> <li>• Utilization Standards - Apply utilization standards to all management areas as shown in WWNF LRMP Tables 4-7 and 4-8. These standards provide for maximum utilization levels regardless of which species of animal uses the forage or browse.</li> <li>• Allotment Management Planning - Include in range allotment management plans a strategy for managing riparian areas for a mix of resource <b>uses</b>. A measurable desired future riparian condition will be established based on existing and potential vegetative conditions.</li> <li>• Allotment Management Planning - Identify management actions needed to meet riparian objectives within the specific time frame. Measurable objectives will be set for key parameters, such as stream surface shaded, streambank stability, and shrub cover. This process <b>is</b> described in 'Managing Riparian Ecosystems (Zones) for Fish and Wildlife in Eastern Oregon and Eastern Washington' (1979)</li> <li>• Allotment Management Planning - Address the monitoring needed to determine the desired rate of improvement is occurring. Allotment management plans currently not consistent with this direction will be developed or revised on a priority basis under a schedule established by the Forest Supervisor (see Appendix C). Some grazing allotments with riparian areas in unsatisfactory range condition (see glossary), and which do not have approved or functioning management plans, have been identified and are displayed in Table 4-9 This list may be supplemented as additional areas are identified. <ul style="list-style-type: none"> <li>○ <i>Range Allotments with identified riparian problems (WWNF</i></li> </ul> </li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p><i>LRMP 1990): Chesnimnus, Doe Creek, Swamp Creek.</i></p> <ul style="list-style-type: none"> <li>• Allotment Management Planning – Identify suitable lands in unsatisfactory range condition (<i>see</i> glossary). Allotment plans with specific objectives for these lands will be developed on a priority basis under a schedule established by the Forest Supervisor. These objectives will define a desired future condition based on existing and potential values for all resources</li> <li>• Allotment Management Planning - The allotment plan will include. (a) a time schedule for improvement, (b) activities needed to meet forage objectives, and (c) a range project effectiveness analysis.</li> </ul>
	<b>Range - Hells Canyon NRA Comprehensive Management Plan – Objectives, Standards and Guidelines (Appendix C, Table C1)</b>
	<p>§ 292.48 Grazing activities. The following standards and guidelines apply to domestic livestock grazing activities on Other Lands, Wild and Scenic Rivers, and Wilderness Lands in the HCNRA.</p> <ul style="list-style-type: none"> <li>(a) Grazing may be authorized only on rangeland determined by the authorized officer to be suitable for grazing and meeting or moving towards satisfactory condition and meeting the conditions described in paragraph (b) of this section.</li> <li>(b) Where domestic livestock grazing is incompatible with the protection, restoration, or maintenance of fish and wildlife or their habitats; public outdoor recreation; conservation of scenic, wilderness, and scientific values; rare combinations of outstanding ecosystems, or the protection and enhancement of the values for which a wild and scenic river was designated, the livestock use shall be modified as necessary to eliminate or avoid the incompatibility. In the event an incompatibility persists after the modification or modification is not feasible, the livestock use shall be terminated.</li> <li>(c) Range improvements must be designed and located to minimize their impact on scenic, cultural, fish and wildlife, and other resources in the HCNRA.</li> <li>(d) The authorization of grazing use, through a grazing permit, must provide for terms and conditions which protect and conserve riparian areas.</li> </ul>
<b>Forest Vegetation (C-34 to 35)</b>	<p>Objectives –</p> <ul style="list-style-type: none"> <li>• For-O2: Manage livestock grazing within forested stands to ensure ecological function and sustainability of understory vegetation consistent with management of overstory vegetation objectives. Use grazing-related standards and guidelines to manage grazed forested understory vegetation.(New)</li> </ul>
<b>Grasslands and Forest Understory (C-42 to 50)</b>	<p>Objectives –</p> <ul style="list-style-type: none"> <li>• Gra-O1: Manage grassland vegetation to ensure continued ecological function and sustainability of native ecosystems. Maintain and/or restore the ecological status of grassland communities to their PNC recognizing their HRV. (New)</li> <li>• Gra-O2: Develop management plans for all active grazing allotments which address identified issues and compatibility with the provisions of the <i>HCNRA Act</i>. (New)</li> <li>• Gra-O3: Evaluate rangeland capability and suitability, and present rangeland condition or ecological status in relation to PNC. (New)</li> <li>• Gra-O4: Evaluate annual impacts associated with livestock grazing in relation to established standards and thresholds. (New)</li> </ul>

	<p><b>Forest plan direction, standards and guidelines applicable to the LJCRP</b></p>
	<p>Standards –</p> <ul style="list-style-type: none"> <li>• Gra-S1: On lands determined to be unsuitable or not capable for grazing by domestic livestock or determined to be in an unsatisfactory condition, the rangeland vegetation production for these lands would not be allocated to the allotment's carrying capacity. (Public LURs, New) However, domestic livestock may still be permitted. In most situations, livestock will not be authorized on lands determined to be unsuitable. In some situations incidental livestock use will be authorized on lands identified as unsuitable. In these situations, livestock will be removed before rangeland vegetation use exceeds 10% and soil disturbance exceeds 10% on lands determined to be unsuitable and authorizing incidental livestock use. (New)</li> <li>• Gra-S2: Satisfactory* condition will be evaluated during the allotment management planning process. The minimum condition and trend standards must be met for rangelands to be considered as satisfactory: (Public LURs, New) <ul style="list-style-type: none"> <li>a. Rangeland vegetation in both upland and riparian habitats will be in a mid-seral** ecological status with an upward trend or higher condition based on PNC. (New)</li> <li>b. Soils, this includes soil surface conditions and soil stability, will be in a mid-seral** ecological status with an upward trend or higher condition based on PNC. (New)</li> <li>c. Riparian hardwood age class will be in a mid-seral** ecological status with an upward trend or higher condition based on PNC. (New)</li> <li>d. Riparian hardwood form class distributions show no more than 10 percent in heavy and 35 percent in moderate long-term browsing impact classes. (New) For those sites identified in unsatisfactory condition, management practices will be designed to improve ecological status to a satisfactory condition. For sites in a satisfactory condition, management practices will maintain or improve the ecological status. (New)</li> </ul> </li> <li>• Where rangeland resources are in an unsatisfactory condition livestock grazing may continue if the rate of recovery is within 70 percent of the natural rate of recovery (recovery on areas with similar ecological type and status without livestock grazing. (New)</li> <li>• The definition of "satisfactory condition" establishes the minimum standards for determining carrying capacity, but does not necessarily define site-specific desired conditions or recovery rates. Other resource goals, objectives, and standards and guidelines in this plan establish the desired conditions for management of the rangeland resources. (New) The "satisfactory condition" definition is required by the <i>Public LURs</i> (36 CFR 292) and relates only to the allocation of available carrying capacity. (New) The rangeland resource inventory will identify the carrying capacity for a land use area. (New) Examples of standards and guidelines that define acceptable conditions and recovery rates include PACFISH direction for riparian condition and recovery, Forest Plan wildlife standards and guidelines. (Forest Plan, PACFISH). ** The mid-seral ecological status will be considered equal to the range condition of fair with an upward trend.</li> <li>• Gra-S3: Allotment management plans (AMPs) would establish site specific rates of recovery to achieve the goals for ecological status, soil conditions, and</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p>riparian management objectives, in conjunction with other applicable resource standards and guidelines contained in this management plan when determining appropriate livestock stocking levels. (New)</p> <ul style="list-style-type: none"> <li>• Gra-S4: When determining carrying capacity and range management objectives during the AMP process and, include other uses such as wildlife, threatened and endangered species, recreation stock, PF, ecological goals, and outfitter and guide activities as specified in the HCNRA Act. (New)</li> <li>• Gra-S5: Implement grazing management practices to minimize the potential for transport of invasive plant propagates or seeds, or creation of habitats suitable for establishment of invasive species. (New)</li> <li>• Gra-S6: Implement Forest Plan utilization standards (pages 4-52 and 53). (Forest Plan) The following maximum upland forage (grass/forb) utilization standards for fall, winter, and spring may be applied once resource objectives are met. Maximum browse standards would not change from those listed in the Forest Plan. Based on plant phenology, climate, and plant responses to grazing, there are three basic periods to manage: fall/winter, early spring, and late spring (in application, the following standards may be converted to allowable stubble height standards): (New)</li> <li>• Fall/Winter Standards -             <ul style="list-style-type: none"> <li>○ This period basically begins when all key perennial forage plants have achieved dormancy. It runs through the dormant period and ends just prior to the initiation of new growth on the key cool season perennial forage species in the spring. In very general terms, this often begins in mid to late October and runs through February, March, or April depending on the elevation, aspect and the weather patterns for a given year. (New)</li> <li>○ Maximum forage utilization standards for this period would be set at 60 percent on the key species (on a site-specific basis). This would be based on a percent of the weight removed from the total annual growth resulting from the previous growing season. (New)</li> </ul> </li> <li>• Early Spring Standards -             <ul style="list-style-type: none"> <li>○ Early spring is defined as that period when the perennial cool season forage plants initiate growth and begin shoot elongation. It extends through the period of maximum carbohydrate use and the beginning of carbohydrate storage. The end of this period is determined by soil moisture. It ends prior to the time that soil moisture is expected to become limiting to the extent that essentially full re-growth cannot be ensured. (New)</li> <li>○ Maximum forage utilization standards for this period would be set at 60 percent of current key cool season species forage production (on a site-specific basis). This is determined on an air-dried weight basis of total current annual production occurring until livestock are removed. Further, all livestock would be removed from the unit based on ensuring that adequate soil moisture exists at the time of removal to provide for essentially full re-growth. Additional monitoring would be conducted on a spot check basis following termination of annual growth for the summer to document that re-growth was achieved. (New)</li> </ul> </li> <li>• Late Spring Standards -             <ul style="list-style-type: none"> <li>○ Late spring is defined as that period when the key perennial cool</li> </ul> </li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p>season forage plant growth is still occurring but soil moisture is beginning to limit growth. Livestock removal is not planned to occur during the time when assurance can be made that essentially full re-growth would occur. (New)</p> <ul style="list-style-type: none"> <li>○ Utilization standards for both forage and browse use for this period would be the same as established by the Forest Plan for the standard summer season grazing. (New)</li> </ul> <p>Guidelines –</p> <ul style="list-style-type: none"> <li>• Gra-G1: Emphasize enhancement and/or restoration of potential native vegetation. (New)</li> <li>• Gra-G2: Incorporate management considerations in <i>Plant Associations of the Wallowa-Snake Province</i> (Johnson and Simon 1987) to determine the appropriate timing, intensity, duration, and frequency of grazing use by community type. Likewise, use <i>Mid Montane Wetlands Classification of the Malheur, Umatilla, and Wallowa- Whitman National Forests</i> (Crowe and Clausnitzer 1997) or other FS approved guides, score cards or keys. (New)</li> <li>• Gra-G3: During the allotment planning process evaluate periodic rest and deferred rotations grazing systems. (New)</li> <li>• Gra-G3: During the AMP process, analyze effects and management of both wildfire and PF in conjunction with domestic livestock grazing to achieve grassland goals, objectives, standards, and guidelines. (New)</li> <li>• Gra-G4: Where feasible and desirable, plan and implement restoration projects to improve the health and sustainability of HCNRA grasslands, where current ecological conditions are mid- or earlier-seral status. (New)</li> <li>• Gra-G6: Encourage the Payette and Nez Perce National Forests to adjust allotment boundaries, for those allotments containing HCNRA lands, to the HCNRA boundary line as opportunities arise. (New)</li> <li>• Gra-G7: Where an allotment or a portion of an allotment is closed, manage those lands as unsuitable for permitted domestic livestock use. Allow recreational or permitted outfitter and guide activities when properly administered. (New)</li> </ul>
<b>Cattle &amp; Horse (C&amp;H) Allotments (C-55)</b>	<ul style="list-style-type: none"> <li>• 071 Jim Creek: Of this 12,490 acre allotment, 12,178 acres would be used as an administrative horse pasture and 312 acres would be closed. (New)</li> </ul>
<b>Administrative Horse Pastures (C-57 to 58)</b>	<p>Objectives –</p> <ul style="list-style-type: none"> <li>• Gra-O1: Administrative horse pastures would exist within the HCNRA for the purpose of maintaining pack and saddle stock. These pastures would be maintained to provide high quality pasture, well-maintained facilities, late to mid-seral vegetative status with a stable trend or better, and a visual appearance that would reflect well on management of the HCNRA. (New)</li> </ul> <p>Standards –</p> <ul style="list-style-type: none"> <li>• Gra-S1: Forest Plan forage utilization standards would be applied on all administrative horse pastures. (New)</li> <li>• Guidelines –</li> <li>• Gra-G1: Develop management plans that would allow for the maintenance of administrative horse pastures to provide a very well managed setting in compliance with the <i>HCNRA Act</i>. Manage pastures to promote and maintain late to mid-seral status with an upward trend for potential natural communities.</li> </ul>

	<b>Forest plan direction, standards and guidelines applicable to the LJCRP</b>
	<p>(New)</p> <ul style="list-style-type: none"> <li>• Gra-G2: Where pastures currently contain nonnative rangeland vegetation, manage for recovery of native species. (New)</li> <li>• Gra-G3: Refine boundaries of administrative horse pastures to minimize conflicts between other uses and to ensure compatibility with the <i>HCNRA Act</i> Section 7(1-7). (New)</li> </ul>
<b>Fire</b>	<p>Standards –</p> <ul style="list-style-type: none"> <li>• Fire-S2: Coordinate WFU and PF projects with permittees within active grazing allotments. (New)</li> </ul> <p>Guidelines –</p> <ul style="list-style-type: none"> <li>• Fire-G4: After fire, use an interdisciplinary team to determine when activities may resume in burned areas. Consider rest from domestic livestock grazing after burning. Coordinate with partners and permittees when setting up guidelines for management of burned areas. Use management strategies that will minimize the potential for introduction and/or spread of noxious weeds and other undesirable nonnative plants. Protect areas of active restoration from management impacts. (New)</li> </ul>

	<b>Other plans and policies applicable to the LJCRP</b>
<b>Soils</b>	<p>Forest Service Manual 2500 –</p> <ul style="list-style-type: none"> <li>• FSM 2520.3-2: In areas where less than 20% DSCs exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 20 percent.</li> <li>• FSM 2520.3-3: In areas where more than 20% DSCs exist from prior activities, the cumulative detrimental effects of project implementation and restoration must, at a minimum, not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality.</li> </ul>
<b>Invasive Plant Species</b>	<p>R6 NFM Invasive Species Program Management Direction (updated 5/30/2013) – Mitigation activities to prevent or control invasive species during project work are the responsibility of that project. Mitigation includes application of all invasive species management activities performed during the fiscal years the project is active. These mitigations also include prescribed pre-treatments of existing infestations prior to project implementation as may be needed to reduce the potential for infestations spreading due to the actions of the project. If invasive species infestations develop on site after project initiation and before the project is closed, it is the responsibility of the project to fund management activities against those infestations. The costs for preventative actions necessary to avoid establishing or spreading invasive species in a project (including but not limited to inspecting and cleaning vehicles and equipment; using certified ‘weed-free’ materials; planting native plants to restore treated areas; surveying, inventorying, and mapping infestations; pre-treating materials or products; erecting barriers, etc.) are considered part of the project costs and should be planned accordingly. When a project goal is to prevent the spread of invasive species from non-Forest Service (external) areas into adjacent NFS lands/waters, the treatment activities are frequently conducted using NFS funds or personnel using agreements established under the Wyden Amendment or other authorities.</p>
<b>Prevention of Invasive Plant Introduction, Establishment</b>	<p>R6 2005 Invasive Plants EIS Standards (1-8) –</p> <ol style="list-style-type: none"> <li>1. Prevention of invasive plant introduction, establishment and spread will be addressed in watershed analysis; roads analysis; fire and fuels management plans, Burned Area Emergency Recovery Plans; emergency wildland fire</li> </ol>

<p><b>and Spread</b></p>	<p>situation analysis; wildland fire implementation plans; grazing allotment management plans, recreation management plans, vegetation management plans, and other land management assessments.</p> <ol style="list-style-type: none"> <li>2. Actions conducted or authorized by written permit by the Forest Service that will operate outside the limits of the road prism (including public works and service contracts), require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands. This standard does not apply to initial attack of wildland fires, and other emergency situations where cleaning would delay response time.</li> <li>3. Use weed-free straw and mulch for all projects, conducted or authorized by the Forest Service, on National Forest System Lands. If State certified straw and/or mulch is not available, individual Forests should require sources certified to be weed free using the North American Weed Free Forage Program standards (see Appendix O) or a similar certification process.</li> <li>4. Use available administrative mechanisms to incorporate invasive plant prevention practices into rangeland management. Examples of administrative mechanisms include, but are not limited to, revising permits and grazing allotment management plans, providing annual operating instructions, and adaptive management. Plan and implement practices in cooperation with the grazing permit holder.</li> <li>5. No Standard.</li> <li>6. Use available administrative mechanisms to incorporate invasive plant prevention practices into rangeland management. Examples of administrative mechanisms include, but are not limited to, revising permits and grazing allotment management plans, providing annual operating instructions, and adaptive management. Plan and implement practices in cooperation with the grazing permit holder.</li> <li>7. Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. <ol style="list-style-type: none"> <li>a. Treat or require treatment of infested sources before any use of pit material.</li> <li>b. Use only gravel, fill, sand, and rock that is judged to be weed free by District or Forest weed specialists.</li> </ol> </li> <li>8. Conduct road blading, brushing and ditch cleaning in areas with high concentrations of invasive plants in consultation with District or Forest-level invasive plant specialists, incorporate invasive plant prevention practices as appropriate.</li> </ol>
<p><b>Invasive Plant Treatments or Restoration</b></p>	<p>R6 2005 Invasive Plants EIS Standards (11-23) –</p> <ol style="list-style-type: none"> <li>11. Prioritize infestations of invasive plants for treatment at the landscape, watershed or larger multiple forest/multiple owner scale.</li> <li>12. Develop a long-term site strategy for restoring/revegetating invasive plant sites prior to treatment.</li> <li>13. Native plant materials are the first choice in revegetation for restoration and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. Non-native, non-invasive plant species may be used in any of the following situations: 1) when needed in emergency conditions to protect basic resource values (e.g., soil stability, water quality and to help prevent the establishment of invasive species), 2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, 3) if native plant materials are not available, or 4) in permanently altered plant communities. Under no circumstances</li> </ol>

	<p>will non-native invasive plant species be used for revegetation.</p> <ol style="list-style-type: none"> <li>14. Use only APHIS and State-approved biological control agents. Agents demonstrated to have direct negative impacts on non-target organisms would not be released.</li> <li>15. Application of any herbicides to treat invasive plants will be performed or directly supervised by a State or Federally licensed applicator. <ol style="list-style-type: none"> <li>a. All treatment projects that involve the use of herbicides will develop and implement herbicide transportation and handling safety plan.</li> </ol> </li> <li>16. Select from herbicide formulations containing one or more of the following 10 active ingredients: chlorsulfuron, clopyralid, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, sethoxydim, sulfometuron methyl, and triclopyr. Mixtures of herbicide formulations containing 3 or less of these active ingredients may be applied where the sum of all individual Hazard Quotients for the relevant application scenarios is less than 1.0.1 <ol style="list-style-type: none"> <li>a. All herbicide application methods are allowed including wicking, wiping, injection, spot, broadcast and aerial, as permitted by the product label. Chlorsulfuron, metsulfuron methyl, and sulfometuron methyl will not be applied aerially. The use of triclopyr is limited to selective application techniques only (e.g., spot spraying, wiping, basal bark, cut stump, injection).</li> <li>b. Additional herbicides and herbicide mixtures may be added in the future at either the Forest Plan or project level through appropriate risk analysis and NEPA/ESA procedures.</li> <li>c. Dicamba, formerly approved for use, was dropped as an approved herbicide.</li> </ol> </li> <li>17. No standard.</li> <li>18. Use only adjuvants (e.g. surfactants, dyes) and inert ingredients reviewed in Forest Service hazard and risk assessment documents such as SERA, 1997a, 1997b; Bakke, 2003.</li> <li>19. To minimize or eliminate direct or indirect negative effects to non-target plants, terrestrial animals, water quality and aquatic biota (including amphibians) from the application of herbicide, use site-specific soil characteristics, proximity to surface water and local water table depth to determine herbicide formulation, size of buffers needed, if any, and application method and timing. Consider herbicides registered for aquatic use where herbicide is likely to be delivered to surface waters.</li> <li>20. Design invasive plant treatments to minimize or eliminate adverse effects to species and critical habitats proposed and/or listed under the Endangered Species Act. This may involve surveying for listed or proposed plants prior to implementing actions within unsurveyed habitat if the action has a reasonable potential to adversely affect the plant species. Use site-specific project design (e.g. application rate and method, timing, wind speed and direction, nozzle type and size, buffers, etc.) to mitigate the potential for adverse disturbance and/or contaminant exposure.</li> <li>21. Provide a minimum buffer of 300 feet for aerial application of herbicides near developed campgrounds, recreation residences and private land (unless otherwise authorized by adjacent private landowners).</li> <li>22. Prohibit aerial application of herbicides within legally designated municipal watersheds.</li> <li>23. Prior to implementation of herbicide treatment projects, National Forest system staff will ensure timely public notification. Treatment areas will be posted to inform the public and forest workers of herbicide application</li> </ol>
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	dates and herbicides used. If requested, individuals may be notified in advance of spray dates.
<b>Watershed</b>	<p>The Interdisciplinary team should consider the following list of management direction including, standard and guidelines, consultation requirements, and management indicator species evaluations regarding fisheries and aquatic resource values in the planning of the Lower Joseph Creek Project.</p> <p>The Wallowa-Whitman National Forest Land and Resource Management Plan (LRMP), as amended by PACFISH, should be incorporated into the project design features. The consultation on the LRMP by the 1998 Snake River Steelhead Biological Opinion, the Reasonable and Prudent Measures and Terms and Conditions, should be incorporated into the project.</p> <p>Incorporate the Blue Mountain Project Design Criteria where appropriate to reduce the risk to federally listed Snake River steelhead and their habitat.</p>
	<p>Riparian Habitat Conservation Areas (RHCAs)</p> <ul style="list-style-type: none"> <li>• PACFISH interim RHCAs will be delineated on all streams as follows: 300 feet horizontal distance on all fishbearing streams, 150 feet horizontal distance on non-fishbearing perennial streams and wetlands greater than one acre, and 100 feet horizontal distance on all non-fishbearing intermittent streams and wetlands less than one acre. The interim RHCA widths apply until a Watershed analysis is completed, a site-specific analysis is conducted and described and the rationale for modification of interim RHCA boundaries is presented, or the interim direction is terminated. A watershed analysis was completed for the Lower Joseph Creek Watershed in 2010.</li> <li>• For areas of precommercial thinning utilize the Blue Mountains Project Design Criteria for activities approved within the RHCA.</li> </ul>
	<p>Channel Stability</p> <ul style="list-style-type: none"> <li>• Maintain natural large wood and trees needed for future recruitment to maintain or restore stream channel and bank structure, maintain or restore water quality, and provide structural fish habitat.</li> </ul>
	<p>Stream Temperature</p> <ul style="list-style-type: none"> <li>• Prevent measurable (greater than 0.5oF change) temperature increases in fish bearing streams. Temperatures on other streams may be increased only to the extent that water quality standards on downstream, fish bearing streams will still be met</li> </ul>
	<p>Transporation System</p> <ul style="list-style-type: none"> <li>• Do not construct roads immediately adjacent to riparian areas. Any planned reconstruction or construction of roads crossing riparian areas will not alter stream or groundwater flow characteristics to the extent that it will impact the riparian area. Locate skid trails and roads to avoid paralleling stream channels in RHCAs. Roads will be managed to minimize impacts to water quality and fish and wildlife habitat. Design and maintain road drainage to prevent the influx of significant amounts of road sediment runoff into streamcourses. Design stream crossings to pass a 100 year flow (culverts, bridges). Follow guidance in 1998 Steelhead Biological Opinion on total road density of 2.0 miles per square mile.</li> </ul>
	<p>Prescribed Fire</p> <ul style="list-style-type: none"> <li>• For areas of prescribed fire and slash pile burning utilize the Blue Mountains Project Design Criteria for activities approved within the RHCA.</li> </ul>
	<p>Log Landings</p> <ul style="list-style-type: none"> <li>• Locate log landings outside of RHCAs unless approved through consultation</li> </ul>

	with NOAA Fisheries.
	<p>Skidding and Skid Trails</p> <ul style="list-style-type: none"> <li>• Skidding down streamcourses or ephemeral draws will not occur. Locate skid trails to avoid paralleling stream channels within the RHCA.</li> </ul>
<b>Wildlife – Other Required Disclosures</b>	<p>Recreational Hunting</p> <ul style="list-style-type: none"> <li>• The Oregon Department of Fish and Wildlife regulates hunting in the Snake River, Imnaha, and Pine Creek Big-Game Management Unit through controlled hunts which requires a hunting tag.</li> </ul>
	<p>Best Available Science</p> <ul style="list-style-type: none"> <li>• The habitat effects analysis meets the advice for incorporating “best available science” in specialist reports for NEPA projects as given in the May 2, 2007 advice letter (Advice on Documenting “Best Available Science”) and the clarification letter dated June 20, 2007 (Clarification of May 2nd 2007, Advice on Documenting “Best Available Science”) issued by the Acting Director and Director for Ecosystem Management Coordination, respectively.</li> <li>• The analysis of effects to species habitat, including riparian and upland habitat, and aquatic species with special management status, was based on a combination of peer reviewed papers published in scientific journals, and publications produce by Forest Service Research Laboratories.</li> </ul>
<b>Migratory Birds</b>	<p>Migratory birds are those that breed in the U.S. and winter south of the border in Central and South America. Many of our well known passerine songbirds, flycatchers, vireos, swallows, thrushes, warblers, and hummingbirds, fall in this category. Most others are included in the resident category. Birds are a vital element of every terrestrial habitat in North America. Conserving habitat for birds will therefore contribute to meeting the needs of other wildlife and entire ecosystems.</p>
	<b>Authorities Related to Bird Management</b>
	<p><b><u>The Migratory Bird Treaty Act of 1918 (MBTA).</u></b>  The MBTA implements various treaties and conventions between the U.S., Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the act, it is unlawful to pursue, hunt, take, capture (or kill) a migratory bird except as permitted by regulation (16 U.S.C. 703-704). The regulations at 50 CFR 21.11 prohibit the take, possession, import, export, transport, sale, purchase, barter, or offering of these activities, or possessing migratory birds, including nests and eggs, except under a valid permit or as permitted in the implementing regulations (Director's Order No. 131). A migratory bird is any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle.</p>
	<p><b><u>Executive Order 13186 (66 Fed. Reg. 3853, January 17, 2001) “Responsibilities of Federal Agencies to Protect Migratory Birds”</u></b>  This Executive Order directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. This Executive Order also requires federal agencies to develop <i>Memorandum of Understandings (MOU)</i> with the FWS to conserve birds including taking steps to restore and enhance habitat, prevent or abate pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible. The FS has completed, and is currently implementing, their MOU with the FWS.</p>
	<p><b>Forest Service &amp; FWS MOU</b>  The purpose of this MOU is, <i>“to strengthen migratory bird conservation by identifying and implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through enhanced collaboration</i></p>

	<p><i>between the Parties, in coordination with State, Tribal, and local governments.”</i></p> <p>Under the MOU the FS Shall:</p> <ul style="list-style-type: none"> <li>• <i>Address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans for national forests and grasslands, consistent with NFMA, ESA, and other authorities listed above. When developing the list of species to be considered in the planning process, consult the current (updated every 5 years) FWS Birds of Conservation Concern, 2008 (BCC), State lists, and comprehensive planning efforts for migratory birds. Within the NEPA process, evaluate the effects of agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors.</i></li> </ul>
<b>Landscape Management</b>	<p>The National Environmental Policy Act of 1969 (NEPA) states that it is the “continuing responsibility of the Federal Government to use all practicable means to assure for all Americans, aesthetically and culturally pleasing surroundings.” NEPA also requires “A systematic and interdisciplinary approach which would insure the integrated use of the natural and social sciences and the environmental design arts into planning and decision-making which may have an impact on man’s environment.” To accomplish this, numerous Federal laws require all Federal land management agencies to consider scenery and aesthetic resources in land management planning, resource planning, project design, implementation, and monitoring.</p>
	<p>Handbooks -</p> <ul style="list-style-type: none"> <li>• National Forest Landscape Management Volume 2, Chapter 1 the Visual Management System (Agriculture Handbook 462, USDA Forest Service 1974)</li> <li>• Landscape Aesthetics, A Handbook for Scenery Management (Agriculture Handbook 701, USDA Forest Service 1995)</li> </ul>
<b>Wild and Scenic River</b>	<p>In addition to the Forest Plan and the Hells Canyon Comprehensive Management Plan, the Joseph Creek Wild and Scenic River Management Plan apply to the LJCRP.</p> <p><b>The Joseph Creek Wild and Scenic River Management Plan (1993)</b></p> <p>Joseph Creek was designated Wild and Scenic in 1988 for the following outstandingly remarkable (OR) values: scenic, recreational, geological, fish and water quality, and cultural values. Site specific assessment resulted in one additional OR value of “wildlife” and the cultural OR was clarified as “cultural (historic)”. All outstandingly remarkable (OR) values must be protected and enhanced, If conflicts arise between OR values which cannot be resolved within the direction of the Act or management plan, then they shall be resolved according to the following priorities: 1) fish and water quality, 2) cultural (historic) resources, 3) scenic, 4) wildlife, 5) recreation, 6) geology.</p>
	<p><b>Joseph Creek Wild and Scenic River Management Plan Landscape Management Standards and Guidelines</b></p>

	<p>50. <b>Landscape Management. (Scenic Outstandingly Remarkable Value)</b></p> <p><b>Desired Future Condition:</b> The Visual Quality Objective (VQO) within the river corridor is Preservation. The area is characterized as a natural appearing landscape (essentially unmodified environment) with ecological changes only. Management activities that could affect the Preservation VQO are prohibited except for prescribed burning to decrease non-native grasses and to improve bighorn sheep habitat and big game winter range. The variety of grasses, forbs, shrubs, and trees will be more representative of the natural community at the time of Euro-American settlement. No recreation facilities will be developed except for primitive signing, trail reconstruction, minor relocation, and trail maintenance.</p> <p>51. Maintain the existing VQO of Preservation in the river corridor.</p> <p>52. Maintain a VQO of foreground preservation and middleground and background Retention outside the river corridor as viewed from the river and/or the Joseph Creek or Swamp Creek trails within the river corridor. A VQO of Preservation, allows ecological changes only. In a VQO of Retention, management activities must not be visually evident.</p> <p>53. Adopt the "Highway 3 Viewshed Corridor Plan" by Stryker Associates, February 1991, as additional guidelines for managing the visual resource outside the river corridor. If conflicts arise between the Highway 3 Viewshed Corridor Plan and the minimum VQOs, as previously mentioned, the more restrictive guidelines will apply.</p> <p>54. Visual management will be according to the Forest Plan, National Forest Landscape Management Handbook Vol. 2 Chapter 1, The Visual Management System USDA #462, The Timber Chapter Vol. 2, Chapter 5, Recreation Chapter Vol. 2 Chapter 8, and Forest Service Manual 2354 and 2380 (FSM 2354 &amp; 2380). Conflicts between any of these documents will be resolved by deferring to the most restrictive unless stated otherwise.</p> <p>55. Outside the river corridor locate utility corridors so that they will not be visible from the river and/or the Joseph Creek or Swamp Creek trails within the river corridor.</p> <p>56. Work with private landowner to help protect and enhance the scenery on the private inholdings in the river corridor and to discourage any additional structures.</p>
	<p>6. Landscape Management and Geology - Annually, monitor the visual quality of the area against values described in the DFCs and to ensure the protection and enhancement of the Scenic and Geologic OR Values. This would include a meeting a Preservation VQO with ecological changes only (except for prescribe burning) and ensuring that no mining activities nor recreational dredging would be take place.</p> <p>a. Key indicators include: Projects or activities which alter landform, vegetation, water, color or character of the viewshed as seen from the river corridor, Joseph and Swamp Creek Trails, and Joseph Canyon Overlook; and the extent and amount of developments as indicated by buildings, structures, and other physical improvements.</p> <p>b. Management standards are: No additional adverse impacts. No damage to geologic resources. No mining activities nor recreational dredging would have occurred. All activities seen from the river, Joseph and Swamp Creek Trails, and Joseph Canyon Overlook would meet a Preservation VQO inside the river corridor (except the prescribe burning activities to improve big horn sheep habitat, big game winter range, and reduce non-native grasses) and would meet a Retention VQO outside the river corridor. If standards not met, identify cause of change on the National Forest and correct it. On private land, work with the landowner to try to mitigate activity, work with county to change zoning, and as a last resort consider acquiring scenic easements.</p> <p>c. Sampling procedure: Annually, field monitor the area for visual changes on private land. Note the number and type of projects, houses, structures or improvements as seen from the river corridor, Joseph Creek and Swamp Creek Trails, and Joseph Canyon Overlook. Analyze individual projects on a case-by-case basis to ensure protection of viewshed and geology. Inspect National Forest lands annually, for evidence of mining activity. Conduct a VQM inventory every 5 years to ensure projects are consistent with DFCs and OR Values.</p>

	Amendments to the 1990 Wallowa-Whitman National Forest plan
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<b>Amendment Number</b>	<b>Date</b>	<b>Amendment Topic</b>
1	03/15/1991	Added a new range allotment planning schedule and made errata type corrections.
2	05/24/1991	Changed about 70 acres from MA 1 to MA 16 to permit development and management of Blue Mountain segment of the Oregon Trail. Changed road and trail visual sensitivity in the same area.
3	12/23/1991	Modified the Wildlife Standard and Guideline No. 5 to incorporate the "Bighorn/Domestic Sheep Management Strategy for the Wallowa-Whitman National Forest". Decision reversed by the Deputy Regional Forester on June 23, 1992.
4	04/02/1992	Changed standards and guidelines to say management of competing and unwanted vegetation will tier to the FEIS for Managing Competing and Unwanted Vegetation, USDA Forest Service, Pacific Northwest Region, December 1988 or subsequent NEPA documents.
5	08/06/1992	Incorporated definitions and review process for river craft for the Snake River Recreation Management area. Allocated Cache Creek area (purchased in June 1991) to Management Area 9 (6,549 acres) and Management Area 16 (7 acres).
6	01/05/1993	Incorporated management direction from the Imnaha Wild and Scenic River Management Plan.
7	07/07/1993	Incorporated management direction for the Lostine Wild and Scenic River.
8	09/13/1993	Incorporated management direction for the North Fork John Day Wild and Scenic River.
9	02/04/1994	Added implementing direction for the use of prescribed fire within wilderness.
10	12/17/1993	Incorporated management direction for the Grande Ronde Wild and Scenic River.
14 (RF#1)	05/20/1994	Extended interim management direction establishing riparian, ecosystem, and wildlife standards for timber sales on Eastside forests pending completion of the Eastside Ecosystem Management Strategy. (Regional Forester Amendment #1).
11	05/26/1994	Added direction for long and short term snag management levels. Redesignated Sufferin Smith Timber Sale to meet eastside ecosystem screens.
12	12/21/1994	Approved the Wild and Scenic Snake River Recreation Management Plan for the administrative area of the Wild and Scenic Snake River corridor.
13	06/07/1994	Incorporated management direction for the Joseph Creek Wild and Scenic River.
15	12/22/1994	Incorporated direction dealing with the management of the Eagle Creek Wild and Scenic River.
16	01/13/1995	Incorporated direction dealing with the management of the Eagle Cap Wilderness and the Minam Wild and Scenic River.
17	02/22/1995	Documented selection of the preferred alternative for the Washington Watershed Project for fuels reduction within the Baker City Watershed. Amendments are 1) eliminate the Washington Gulch C&H domestic grazing allotment and close the area to domestic livestock grazing; 2) treatment of late/old structure stands – treatment will not meet RF 1; 3) allocate 300 acres of old-growth habitat (MA 15) and a 300-acre pileated woodpecker feeding area.

<b>Amendments to the 1990 Wallowa-Whitman National Forest plan</b>		
<b>Amendment Number</b>	<b>Date</b>	<b>Amendment Topic</b>
18	07/13/1995	Incorporated direction dealing with the management of the North Powder Wild and Scenic River.
RF 3	02/24/1995	Interim Strategies for Managing Anadromous Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH). (Regional Forester Amendment #3).
RF 2	06/08/1995	Revised Interim Standards for Timber Sales on Eastside Forests. (Regional Forester Amendment #2).
RF 4	07/28/1995	Interim Strategies for Managing Inland Fish-producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (INFISH). (Regional Forester Amendment #4).
19	07/31/1995	Documented selection of the preferred alternative for the Eagle-Paddy Timber Sale, which affected the Eastside Screens.
20	09/09/1996	Added direction to the Wild and Scenic Snake River Recreation Management Plan to proceed with implementation of proposed outfitter-guide use allocations and operational limitations.
22	12/18/1996	Documented selection of the preferred alternative for Dark Horn Salvage Sale Project. Affected PACFISH by treating riparian habitat conservation areas.
23	12/18/1996	Documented selection of the preferred alternative for Eagle Holcomb Timber Sale. Affected Eastside Screens by harvesting trees greater than 21 inches DBH. As a result of administrative appeals, trees greater than 21 inches were dropped from the sale.
21	05/13/1997	Documented selection of preferred alternative for Spring Creek Restoration Project. Affected PACFISH by treating riparian habitat conservation areas.
24	07/14/1997	Allowed harvest in 34 acres of Late Old Structure stands in the Dry Melon Timber Sale. Affected Regional Forester Amendment #2 by harvesting LOS stages in a watershed that is below the Historic Range of Variation for LOS.
25	05/05/1999	Established direction for management of outfitters and guides in the Eagle Cap Wilderness.
26	03/20/2000	Allowed cutting of trees greater than 21 inches in diameter on the Starkey Research Restoration and Fuels Reduction Project to validate squirrel/dwarf mistletoe research.
27a	05/10/2000	Changed the Government Draw Research Natural Area from a “proposed RNA” to an “established RNA”. Name was later changed to Gerald S. Strickler RNA.
27b	05/01/2001	Carrol Creek Fire Salvage and Restoration Project – Modified area of Old Growth designation.
28	05/25/2001	Changed Vance Knoll Research Natural Area from a “proposed RNA” to an “established RNA”.
29	07/21/2003	Revised Comprehensive Management Plan for the Hells Canyon National Recreation Area.
30	03/19/2004	Documented selection of Alternative D for Spooner Vegetation Management Project. Adopted applicable conservation measures from the 2000 Canada Lynx Conservation Assessment and Strategy for the Spooner project area.

<b>Amendments to the 1990 Wallowa-Whitman National Forest plan</b>		
<b>Amendment Number</b>	<b>Date</b>	<b>Amendment Topic</b>
31	11/10/2004	Changed Duck Lake Research Natural Area from a “proposed RNA” to an “established RNA”.
32	12/15/2004	Mt. Emily Fuels Reduction project – The Forest Plan Amendment includes changes to two sections in the Forest Plan for the Mt. Emily analysis area. The two sections are: 1) treatment of late and old structure that are below the historic range of variability and 2) treatment in the Bull Canyon allocated old growth (MA 15).
33	9/30/2005	Moss-Potters Restoration Project - Added applicable conservation measures from the Canada Lynx Conservation Assessment and Strategy for the project area.
RF 5	10/11/2005	Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants – new goals, objectives, and standards for managing invasive plants.
34	6/28/2006	Mt. Emily II – Forest Plan amendments for: 1) treatment of late and old structure that are below the historic range of variability and 2) added applicable conservation measures from the Canada Lynx Conservation Assessment and Strategy for the project area.
35	2/22/2007	Bald Angel Vegetation Management Project –Forest Plan amendment needed for treatment of late and old structure that is below the historic range of variability – Decision pulled in July 2006, new decision made in February, 2007
36	12/18/2006	Mt. Howard - Forest Plan amendments for: 1) treatment of late and old structure below the historic range of variability and 2) added applicable conservation measures from the Canada Lynx Conservation Assessment and Strategy for the project area.
37	4/22/2008	Medical Springs
38	8/18/2008	Horsefly Vegetation Management Project – Forest Plan Amendments needed for 1) 1) treatment of late and old structure below the historic range of variability, 2) treatment in areas of marginal cover in MA 3, and 3) removal of trees over 21” dbh to treat mistletoe infestation
39	4/9/2010	Sugar Vegetation Management Project – Forest Plan amendment for treatment of LOS below HRV.
40	8/26/2010	Tremble Aspen Restoration Project – Forest Plan amendment for 1) harvest of live trees greater than 21-inch diameter, and 2) harvest within LOS for other than moving from one LOS stage to another.
41	11/03/11	Muddy Sled Vegetation Management – Changes MA designation immediately surrounding Sled Springs Administrative Site, including changing 6 acres of MA 15 (old growth) to MA 1 and providing 2 replacement old growth stands totaling 58 acres.
42	11/30/11	Cove II WUI – Forest plan amendments for 1) harvest in MSLT below HRV, and 2) harvest in MA 15 old growth.
43	Decision Withdrawn	Travel Management Plan
44		Snow Basin Vegetation Management Project – Forest Plan amendment for 1) harvest of live trees great than 21-inch diameter, and 2) harvest in LOS below HRV.



## Appendix C - Landscape Modeling Methods

Scenario projections for vegetation growth, development, management, and natural disturbance for the Lower Joseph Creek Restoration project area was done using state and transition models (STMs) developed as part of the Integrated Landscape Assessment Project (ILAP). ILAP was designed to support ecosystem management planning and assessments across all forests, woodlands, and arid lands of Arizona, New Mexico, Oregon, and Washington. The project explored the dynamics of broad scale, multi-ownership, vegetated landscapes by integrating information about current and future vegetation and fuel conditions, climate change, wildlife habitat, fuel treatment economics, and community economics (Burcsu et al. In Press). STMs were used by the ILAP effort to represent the range of vegetation types from forested to arid lands and project changes from vegetation community development, natural disturbances, and management events.

According to Burcsu et al. (In Press),

“STMs can be thought of as box and arrow diagrams of vegetation where boxes represent states within the vegetation type in which properties are temporally-related and can be described using structural and functional attributes, and may include one or more successional phases (Bestelmeyer et al. 2009). In this concept arrows represent the drivers causing state change, such as succession, disturbance, and management (Stringham et al. 2003). STMs can be designed to address both broad- and fine-scale research questions. STMs have been used extensively in rangeland management to represent highly dynamic and perturbation-sensitive rangeland ecosystems (Stringham et al. 2003) Briske et al. 2005, Petersen et al. 2009), examine ecosystem resilience and the effects of restoration (Forbis et al. 2006), to project the distribution of states on the landscape and their associated changes through time as part of an integrative modeling framework for planning (Baker 1989, Hemstrom et al. 2007, Vavra et al. 2007, Wales et al. 2007, Bestelmeyer et al. 2009). As a decision support tool, this type of model allows synthesis of assumptions about vegetation growth, natural disturbance regimes, and management regimes in a single modeling environment (Bestelmeyer et al. 2003, Hemstrom et al. 2007). Models developed under this framework are also relatively simple to parameterize and can integrate information from expert opinions with information derived from data (Stringham et al. 2003) Provencher et al. 2009).”

“...individual STMs represented vegetation dynamics (alternate states, successional processes, disturbance, etc.) within units of potential vegetation. Potential vegetation was a useful modeling unit because common species assemblages, site productivity and disturbance patterns could be represented, and finer classifications (plant association groups and plant associations) commonly used by federal land management agencies for planning and project implementation (e.g., Hall 1998) could also be included. More importantly, potential vegetation types provided concise descriptions of biophysical conditions and disturbance regimes. Within our project area, potential vegetation maps provided the ecological boundaries and area in which each STM operated, similar to the use of Biophysical Setting (BpS) by the LANDFIRE project (Rollins 2009), or the Ecological Site Descriptions (ESD) by the Natural Resources Conservation Service ([www.nrcs.usda.gov](http://www.nrcs.usda.gov)).”

Burcsu et al. (In Press) describe the individual state classes (boxes) within ILAP STMs as representing *cover types*, usually the dominant species or vegetation assemblage, and *structural stages*, based on physical attributes such as vegetation height, percent cover, and canopy layers. For example, in a forest type STM a state may have represented ponderosa pine of the 10-15” diameter class in multiple structural stages, depending on whether it had open, mid, or closed canopy cover.

The transitions (arrows) in the STMs simulated successional processes such as growth and development, natural disturbances such as wildfire and insect outbreaks, and management actions such as prescribed wildfire and tree harvesting (Burcsu et al. In Press). Transitions were classified as either deterministic or

probabilistic. Deterministic transitions occurred at a specific vegetation age, whereas probabilistic transitions were defined by an annual transition probability. Some transitions moved vegetation from one state class to another, for instance a stand-replacing disturbance moved vegetation from a dense forest to a grass/forb state. Other transitions resulted in vegetation remaining in the same state, such as surface fires, mild insect activity, drought, and some types of grazing.

To link these abstract STM states to current landscape conditions, spatial data representing current vegetation conditions were used. The spatial area in each of the current vegetation's discrete classes (of cover type and structure) allocated area by modeling strata into the various states within a model, forming the modeling initial conditions. These initial conditions provided the starting point from which STMs projections began. Current vegetation data came from a combination of maps developed from recent stand examinations for those vegetation stands within the Lower Joseph project area and ILAP data for the stands surrounding the project area. Current and potential vegetation data were re-sampled from the original ILAP 30m pixels to 90m pixels or, in the case of recent stand exams, from stand exam polygons to 90m pixels.

STMs were run using the StSim modeling platform (<http://www.apexrms.com/projects/stsm>). All models used Monte Carlo simulations of variation in wildfire and insect/disease disturbances. Except for the Historical Range of Variability simulations, wildfire and other natural disturbance probabilities were from the ILAP models and, for wildfire, were derived from Monitoring Trends in Burn Severity data ([www.mtbs.gov](http://www.mtbs.gov)). Annual variation in wildfire was estimated from the Monitoring Trends in Burn Severity data. Annual variation in insect/disease disturbances came from expert opinion supplied by Craig Schmidt (entomologist, USDA Forest Service, retired) and other local experts.

#### General Assumptions

1. The modeling area is a rectangle that includes the Lower Joseph project area. The rectangle is large enough to reduce or eliminate edge effects for fire and other disturbances that propagate into the Lower Joseph Project Area from origin points outside the project area. The modeling rectangle is about 453,000 acres in size. National Forest System (NFS) lands in the Project Area are about 103,000 acres. Project area boundary spatial data were supplied by the Blue Mountains Restoration Team (BMRT). Hemstrom selected the modeling rectangle.
2. To model direct and indirect effects, management disturbances are turned off on all lands outside the project area. Cumulative effects assessments used management disturbance assumptions for non-NFS lands based on the best available information.
3. Outside the project area, existing vegetation condition spatial data for cover type and structure stage are from the Integrated Landscape Assessment Project (ILAP) as modified by Chris Zanger (TNC) using methods developed by Mike Simpson and others. Data were re-sampled to a 90m grid (approximately 2 acres per grid cell).
4. For the project area only, data from local stand exams and the Wallowa-Whitman NF EVG database were substituted for ILAP data. These local data for the project area were supplied by the BMRT and were cross-walked to modeling cover types and structure classes by Hemstrom.
5. Potential Vegetation Type (PVT) spatial data came from ILAP.
6. Spatial data on Management Areas from the existing Wallowa-Whitman NF Plan were supplied by the BMRT, accessed from: <http://www.fs.fed.us/r6/data-library/gis/umatilla/index.shtml> (Wallowa-Whitman, Umatilla, Malheur), and <http://www.fs.fed.us/r6/data-library/gis/ochoco/> (Ochoco).
7. Proposed and alternative commercial harvest unit and potential pre-commercial thinning unit spatial data were supplied by the BMRT.
8. Wildlife habitat relationships to modeled PVT and state class were supplied by the BMRT.

9. Preliminary timber volume outputs were estimated using volume tables for each state class generated by Xiaoping Zhou (PNW Research Station) specifically for the Blue Mountains. She used Forest Inventory and Analysis plot data to estimate volume, biomass, and other characteristics as part of the ILAP effort (Zhou and Hemstrom 2010). A difference method was used to estimate removed volume: volume in the ending state class following a timber harvest transition was subtracted from volume in the beginning state class before harvest. The difference was assumed to approximate or index the timber volume removed by harvest transitions.
10. All spatial inputs to the model were re-sampled to a 90m grid to match the existing and potential vegetation data inputs. This resulted in the generalization of finer-scale data.
11. All modeling results and estimates derived from them should be considered approximations and DRAFT, subject to change.

#### Reference Conditions Scenario

1. The Reference Conditions (RC) scenario reflects the long-term effects of no management and no wildfire suppression, hypothetically representing the Historic Range of Variation, e.g. conditions prior to about 1850.
2. Wildfire probabilities were cross-walked to ILAP PVTs from LANDFIRE National (2010) models and biophysical environment data. A group involving Shlisky, Zanger (TNC), Simpson, Hemstrom, and others developed the cross-walk of LANDFIRE biophysical environments to PVTs. In general, LANDFIRE wildfire probabilities for the reference condition were 4 to 8 times greater than current annual probabilities, though there was considerable variation.
3. There were no available assumptions to use for reference conditions insect and disease disturbances, so current insect and disease disturbance assumptions were used.
4. RC models were run for 500 years and 5 Monte Carlo simulations, beginning with current conditions. Examination of the results suggested that vegetation and disturbance conditions changed rapidly for the first 150 years, then stabilized around a set of values after about 300 years. Model results from years 300 to 500 years were used for analysis.
5. Initial conditions are not considered to highly influence final, stable conditions produced after 300-500 years of simulation.

#### No Action Scenario

1. The No Action (NA) scenario reflects short to mid-term effects of current levels of stand growth and succession without management, aside from current levels of fire suppression.
2. All management activities aside from current levels of fire suppression were turned off on all lands.
3. Models were run for 30 years and 5 Monte Carlo simulations, starting with current conditions.

#### Proposed Action Scenario

1. The Proposed Action (PA) scenario reflects short to mid-term effects of the proposed actions developed by the BMRT. The PA is designed to actively move as much area as realistically possible toward reference conditions across multiple management areas.
2. Commercial thinning was applied to all commercial thinning unit areas within boundaries supplied by the BMRT. These treatment boundaries crossed an assortment of management areas. The PA allowed limited harvest of trees over 21" DBH as long as the trees were not old. The state and transition model includes two kinds of commercial thinning partial harvests (PH); one that causes a change in cover type (e.g. from Douglas-fir to western larch in cool, moist forests) and one that does not. Modeling assumed that commercial thinning targeted to change cover types might harvest some level of trees over 21" DBH, but commercial thinning that does not change cover type would remove very few, if any, trees over 21" DBH. Since the PA scenario was designed to move cover type to that reflected by reference conditions, the model emphasized thinning that changed cover type by equally splitting harvest targets between the two types of thinning.
3. Pre-commercial thinning (PCT) was applied in a similar fashion to treatment area boundaries supplied by the BMRT. PCT was applied in two ways in the model; one that changed cover type and one that did not. PCT was only applied to seedling/sapling and pole size classes in the model and was assumed not to remove any trees over 21" DBH regardless of scenario. Since the PA scenario attempted to move forest cover type toward reference conditions, the models targeted equal amounts of PCT that changed cover type and PCT that did not. The model assumed that PCT would be done over a period of 10 years and would target the entire area within the PCT unit boundaries supplied by the BMRT. Where commercial and PCT unit boundaries overlapped, they were targeted for commercial harvest rather than PCT.
4. Prescribed Fire was modeled for all appropriate dry forest stands (e.g. where trees were large enough to survive Rx Fire). This dry forest Rx Fire effort started after the initial 10 year period and continued for 20 years. Rx Fire was allowed in any management area within the 103,000 acre project area. Rx Fire was modeled to achieve a 1 in 20 probability for any acre to be treated in any one year. Time since treatment for Rx Fire was set to 20 years to prevent re-treating the same areas within the 20 year time frame.
5. Models were run for 30 years and 5 Monte Carlo simulations.

#### Alternative 3

1. Alternative 3 (A3) removes PH and PCT treatment from management areas designated as inventoried roadless, old growth management areas (MA 15), and the riparian habitat conservation area network. Excluded management area designations were supplied by the BMRT. It also removes harvest of trees over 21" DBH.
2. The models were run on vegetation data derived from the area excluded from both PH and PCT treatments using designations supplied by the BMRT. This removed considerable area from treatment compared to the PA scenario and resulted in relatively lower treatment amounts over the 10 year treatment period compared to the PA.

3. The model turned off all PH treatments that changed forest cover type since these treatments were assumed to remove some trees over 21" DBH. However, the model did not turn off PCT treatments that changed cover type because A3 still had the goal of moving cover type toward reference conditions within the constraints imposed. PCT was assumed not to remove trees over 21" DBH.
4. Prescribed Fire was modeled for all appropriate dry forest stands (e.g. where trees were large enough to survive Rx Fire). This dry forest Rx Fire effort started after the initial 10 year period and continued for 20 years. Rx Fire was allowed in any management area within the 103,000 acre project area. Rx Fire was modeled to achieve a 1 in 20 probability for any acre to be treated in any one year. Time since treatment for Rx Fire was set to 20 years to prevent re-treating the same areas within the 20 year time frame.
5. Models were run for 30 years and 5 Monte Carlo simulations.

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## Appendix D – Burn probability modeling methods

The Blue Mountains Restoration Team analyzed wildland fire probability as a component of the landscape analysis for the LJCRP and surrounding lands (as a potential influence to disturbance probabilities outside the project boundary). The FSim platform was chosen since it offers the most robust modeling framework with rich inputs for weather, wind, and historic fires. The large-fire simulation system, FSim, consists of modules for weather, fire occurrence, fire growth, and fire suppression. The system is designed to simulate the occurrence and growth of fires for thousands of years in order to estimate average burn probabilities and fire size distributions. It was applied independently to 6-10 delineated areas of the landscape, called Fire Planning Units (FPUs,) in the Blue Mountains. Each model component, data inputs and outputs and FPU are described in the following sections.

### Inputs:

**Fire Planning Units (FPU's)** – Due to the large size of the Blue Mountains landscape and the associated large and cumbersome database size, the landscape was too large for FSim to effectively run. Given this modeling limitation, the landscape was broken into areas used by the Blue Mountains Forests known as FPUs. The USFS's Fire Danger Rating Areas (FDRAs) were used as the starting geography point for analysis. The FDRAs were further reduced based on vegetation condition and Forest Boundaries. The intent was to create similar sized rectangular blocks with similar vegetation, management, and fire behavior influences such as weather, topography, and assumed fire regime.

**Weather** – The necessary weather files for each FPU were generated from Fire Family Plus based on expert opinion and Remote Automated Weather Station (RAWS) data. In some cases the multiple RAWS data were combined for an FPU. Local expert opinion was utilized to give a weighted percent to each RAWS station so that the Fire Family Plus weather input represented the most frequent trend for each FPU.

**Historical Fire Occurrences Density** - The historical fire data used in this analysis was based on the Historical national fire occurrences data that Karen Short compiled for the Continental US Analysis with Mark Finney.

**Fuels and topography** - Spatial information on fuels and topography was obtained at 30 m resolution from 2012 LANDFIRE in a Landscape file (.LCP) and then resampled to 90 m resolution to achieve practical simulation run times.

### Outputs:

Each FPU was buffered 10 miles to allow for fires to burn onto the landscape and limit edge effect. The outputs from all the FPUs merged into a single landscape level output using a statistical overlay for the overlapping areas. The landscape outputs are described below.

- **Burn Probability** – A spatial layer with 0-100 % probability of a pixel burning in a given year.
- **Fire Intensity Level, FIL ( 1- 6)** – Six spatial layers with intensity by Flame Length categories. Each spatial FIL has a probability, the sum of all 6 equal the overall Burn Probability.
- **Mean Fire Intensity** – A spatial layer with the mean intensity values for each pixel



## Appendix E – Proposed, Threatened, Endangered, Sensitive Plant, Wildlife, and Aquatic Species (TES)

This appendix lists the existing conditions for proposed, threatened, endangered and sensitive wildlife species applicable to the Lower Joseph Creek Restoration Project area. The list of federally-listed species applicable to the planning area was obtained from the U.S. Fish and Wildlife Service (USDI Fish and Wildlife Service 2011). No proposed or federally-listed terrestrial wildlife species were described for Wallowa County, Oregon. The USFS Region 6 Regional Forester's Sensitive Species List, dated January 31, 2011 (USDA Forest Service 2011) was reviewed for sensitive species potentially applicable to the Lower Joseph Project. A key to codes follows the table.

Taxon	ScientificName	CommonName	Federal Status	Global Rank	Subspecies Rank	ORBIC State Rank	ORBIC State Breeding Rank	ODA ODFW State Status	USFS Sensitive Species Category	Wallowa-Whitman NF	LJCRP
Anadromous Fish	ONCORHYNCHUS MYKISS (MIDDLE COLUMBIA RIVER)	STEELHEAD	FT	G5Q	T2	S2		CR	FT	I	N
Anadromous Fish	ONCORHYNCHUS MYKISS (SNAKE RIVER BASIN)	STEELHEAD	FT	G5Q	T2T3	S2S3		V	FT	D	D
Anadromous Fish	ONCORHYNCHUS NERKA (SNAKE RIVER, MIGRATORY HABITAT ONLY)	SOCKEYE SALMON	FE	G5Q	T1	S1M	SXB		FE	D	N
Anadromous Fish	ONCORHYNCHUS TSHAWYTSCHA (SNAKE RIVER SPRING/SUMMER RUNS)	CHINOOK SALMON	FT	G5Q	T1	S1		ST	FT	D	N
Anadromous Fish	ONCORHYNCHUS TSHAWYTSCHA (SNAKE RIVER FALL RUNS)	CHINOOK SALMON	FT	G5Q	T1	S1		ST	FT	D	N
Non-anadromous Fish	ONCORHYNCHUS CLARKII LEWISI	WESTSLOPE CUTTHROAT TROUT		G4	T3	S3		CR	OR-SEN	D	N

Non-anadromous Fish	SALVELINUS CONFLUENTUS	BULL TROUT	FT	G3Q	T2	S2		CR/V	FT	D	N
Bird	BARTRAMIA LONGICAUDA	UPLAND SANDPIPER		G5			S1B	CR	OR-SEN	D	N
Bird	BUCEPHALA ALBEOLA	BUFFLEHEAD		G5		S5N	S2B		OR-SEN	S	N
Bird	CENTROCERCUS UROPHASIANUS (OUTSIDE COLUMBIA BASIN)	GREATER SAGE-GROUSE	FC	G4		S3		V	OR-SEN	D	N
Bird	CYPSELOIDES NIGER	BLACK SWIFT		G4			S2B		OR-SEN	D	N
Bird	FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON		G4	T4		S2B	V	SEN	D	D
Bird	HALIAEETUS LEUCOCEPHALUS	BALD EAGLE		G5		S4N	S4B	ST	SEN	D	S
Bird	HISTRIONICUS HISTRIONICUS	HARLEQUIN DUCK		G4		S3N	S2B		SEN	D	N
Bird	LEUCOSTICTE ATRATA	BLACK ROSY FINCH		G4			S2B		OR-SEN	S	N
Bird	LEUCOSTICTE TEPHROCOTIS WALLOWA	WALLOWA ROSY FINCH		G5	T2	S2?N	S2B		OR-SEN	D	N
Bird	MELANERPES LEWIS	LEWIS' WOODPECKER		G4			S2S3B	CR	SEN	D	S
Bird	PICOIDES ALBOLARVATUS	WHITE-HEADED WOODPECKER		G4		S2S3		CR	SEN	D	S
Bird	TYMPANUCHUS PHASIANELLUS COLUMBIANUS	COLUMBIAN SHARP-TAILED GROUSE		G4	T3	S1		CR	OR-SEN	D	N
Amphibian	ASCAPHUS MONTANUS	ROCKY MOUNTAIN TAILED FROG		G4		S2		V	SEN	D	D

Amphibian	RANA LUTEIVENTRIS (OUTSIDE GREAT BASIN)	COLUMBIA SPOTTED FROG		G4		S2S3		CR/V	OR-SEN	D	S
Mammal	CANIS LUPUS (NORTHERN ROCKY MTN.)	GRAY WOLF		G4		S1S2		SE	SEN	D	D
Mammal	CORYNORHINUS TOWNSENDII	TOWNSEND'S BIG- EARED BAT		G4		S2		CR	SEN	D	D
Mammal	EUDERMA MACULATUM	SPOTTED BAT		G4		S2		V	OR-SEN	D	S
Mammal	GULO GULO LUSCUS	NORTH AMERICAN WOLVERINE	FC	G4	T3	S1		ST	SEN	D	N
Mammal	LYNX CANADENSIS	CANADA LYNX	FT	G5		S1?			FT	D	N
Mammal	MYOTIS THYSANODES	FRINGED MYOTIS		G4G5		S2		V	OR-SEN	D	S
Fungus	RHIZOGOGON SUBCLAVITISPORUS	TRUFFLE		G2G3		S1			OR-STR	S	S
Fungus	RHIZOGOGON BACILLISPORUS	TRUFFLE		G2G3		S1			OR-STR	D	S
Bryophyte	ANASTROPHYLLUM MINUTUM	LIVERWORT		G5		S1			OR-SEN	D	N
Bryophyte	ANOMOBRYUM FILIFORME	COMMON SILVER MOSS		G4G5		S1			OR-STR	D	S
Bryophyte	ANTHELIA JULACEA	LIVERWORT		G3G4		S1			OR-SEN	D	N
Bryophyte	BARBILOPHOZIA LYCOPODIODES	LIVERWORT		G5		S1			OR-SEN	D	N
Bryophyte	BUXBAUMIA APHYLLA	BUG ON A STICK MOSS		G4G5		S2			OR-STR	D	S
Bryophyte	ENCALYPTA BREVIPES	MOSS		G3		S1			OR-SEN	S	S
Bryophyte	ENTOSTHODON FASCICULARIS	MOSS		G4G5		S1			OR-SEN	S	S

Bryophyte	HARPANTHUS FLOTOVIANUS	LIVERWORT		G5		S1			OR-SEN	D	N
Bryophyte	HELODIUM BLANDOWII	MOSS		G5		S2			OR-SEN	S	N
Bryophyte	JUNGERMANNIA POLARIS	LIVERWORT		G4		S1			OR-SEN	D	N
Bryophyte	LOPHOZIA GILLMANII	LIVERWORT		G5		S1			OR-SEN	D	N
Bryophyte	PELTOLEPIS QUADRATA	LIVERWORT		G4		S1			OR-SEN	D	N
Bryophyte	PREISSIA QUADRATA	LIVERWORT		G5		S2			OR-SEN	D	N
Bryophyte	PSEUDOCALLIERGON TRIFARIUM	MOSS		G4		S1			OR-SEN	S	N
Bryophyte	PTILIDIUM PULCHERRIMUM	LIVERWORT		G5		S1			OR-SEN	D	S
Bryophyte	SCHISTIDIUM CINCLIDODONTEUM	MOSS		G2G3		S1			OR-SEN	D	N
Bryophyte	SCHISTOSTEGA PENNATA	MOSS		G3G4		S2			OR-SEN	S	S
Bryophyte	SPLACHNUM AMPULLACEUM	MOSS		G5		S1			OR-SEN	S	S
Bryophyte	TETRAPHIS GENICULATA	MOSS		G3G5		S1			OR-SEN	S	S
Bryophyte	TOMENTYPNUM NITENS	MOSS		G5		S2			OR-SEN	S	N
Bryophyte	TORTULA MUCRONIFOLIA	MOSS		G5		S2			OR-SEN	S	S
Lichen	THELENELLA MUSCORUM V. OCTOSPORA	EIGHT-SPORED MOSS CRUST		G4G5	T4T5	S2			OR-STR	S	S
Vascular Plant	ACHNATHERUM WALLOWAENSIS	WALLOWA RICEGRASS		G2G3		S2S3			OR-SEN	D	D
Vascular Plant	ALLIUM GEYERI VAR. GEYERI	GEYER'S ONION		G4G5	T4	S1			OR-SEN	D	S

Vascular Plant	ARABIS HASTATULA	HELLS CANYON ROCKCRESS		G2		S2			OR-SEN	D	S
Vascular Plant	ASPLENIUM TRICHOMANES-RAMOSUM	GREEN SPLEENWORT		G4		S1			OR-SEN	D	N
Vascular Plant	BOTRYCHIUM ASCENDENS	UPWARD-LOBED MOONWORT		G2G3		S2		SC	SEN	D	N
Vascular Plant	BOTRYCHIUM CAMPESTRE	PRAIRIE MOONWORT		G3G4		S1			OR-SEN	D	N
Vascular Plant	BOTRYCHIUM CRENULATUM	CRENULATE MOONWORT		G3		S2		SC	SEN	D	S
Vascular Plant	BOTRYCHIUM HESPERIUM	WESTERN MOONWORT		G4		S1			SEN	D	S
Vascular Plant	BOTRYCHIUM LINEARE	SLENDER MOONWORT		G2?		S1			SEN	D	N
Vascular Plant	BOTRYCHIUM LUNARIA	MOONWORT		G5		S2			OR-SEN	D	S
Vascular Plant	BOTRYCHIUM MONTANUM	MOUNTAIN GRAPE-FERN		G3		S2			OR-SEN	D	S
Vascular Plant	BOTRYCHIUM PARADOXUM	TWIN-SPIKED MOONWORT		G2		S1		SC	SEN	D	N
Vascular Plant	BOTRYCHIUM PEDUNCULOSUM	STALKED MOONWORT		G2G3		S1		SC	SEN	D	S
Vascular Plant	BUPLEURUM AMERICANUM	BUPLEURUM		G5		S1			OR-SEN	D	N
Vascular Plant	CALOCHORTUS MACROCARPUS VAR. MACULOSUS	GREEN-BAND MARIPOSA-LILY		G5	T2	S2			SEN	D	D
Vascular Plant	CALOCHORTUS NITIDUS	BROAD-FRUIT MARIPOSA-LILY		G3		S1			SEN	S	N
Vascular Plant	CAREX ATROSQUAMA	BLACKENED SEDGE		G4?		S1			OR-SEN	D	N
Vascular Plant	CAREX CAPILLARIS	HAIRLIKE SEDGE		G5		S2			SEN	D	N
Vascular Plant	CAREX CAPITATA	CAPITATE SEDGE		G5		S2			OR-SEN	S	N

Vascular Plant	CAREX CORDILLERANA	CORDILLERAN SEDGE		G3G4		S2			OR-SEN	D	S
Vascular Plant	CAREX DIANDRA	LESSER PANICLED SEDGE		G5		S1			OR-SEN	S	N
Vascular Plant	CAREX DURIUSCULA	NEEDLELEAF SEDGE		G5		SH			OR-STR	S	S
Vascular Plant	CAREX GYNOCRATES	YELLOW BOG SEDGE		G5		S1			SEN	D	N
Vascular Plant	CAREX IDAHOA	IDAHO SEDGE		G2G3		S1			OR-SEN	S	N
Vascular Plant	CAREX LASIOCARPA VAR. AMERICANA	SLENDER SEDGE		G5	T5	S2			OR-SEN	D	N
Vascular Plant	CAREX MEDIA	INTERMEDIATE SEDGE		G5?		S1			SEN	D	N
Vascular Plant	CAREX MICROPODA	PYRENAEAN SEDGE		G5		S1			OR-SEN	D	N
Vascular Plant	CAREX NARDINA	SPIKENARD SEDGE		G4G5		S2?			OR-SEN	D	N
Vascular Plant	CAREX PELOCARPA	NEW SEDGE		G4G5		S1			OR-SEN	D	N
Vascular Plant	CAREX RETRORSA	RETRORSE SEDGE		G5		S1			OR-SEN	D	N
Vascular Plant	CAREX SAXATILIS	RUSSET SEDGE		G5		S1			OR-SEN	D	N
Vascular Plant	CAREX SUBNIGRICANS	DARK ALPINE SEDGE		G5		S1			OR-SEN	D	N
Vascular Plant	CAREX VERNACULA	NATIVE SEDGE		G5		S2			OR-SEN	D	N
Vascular Plant	CASTILLEJA FLAVA VAR. RUSTICA	RURAL PAINTBRUSH		G4G5	T3T4	S1			OR-SEN	D	N
Vascular Plant	CASTILLEJA FRATERNA	FRATERNAL PAINTBRUSH		G2		S2			OR-SEN	D	N
Vascular Plant	CASTILLEJA RUBIDA	PURPLE ALPINE PAINTBRUSH		G2		S2			OR-SEN	D	N
Vascular Plant	CHEILANTHES FEEI	FEE'S LIP-FERN		G5		S2			SEN	D	N

Vascular Plant	CRYPTOGRAMMA STELLERI	STELLER'S ROCKBRAKE		G5		S1			SEN	D	N
Vascular Plant	CYPERUS LUPULINUS SSP. LUPULINUS	A CYPERUS		G5	T5?	S1			OR-SEN	D	N
Vascular Plant	CYPRIPEDIUM FASCICULATUM	CLUSTERED LADY'S-SLIPPER		G4		S2		SC	OR-SEN	D	S
Vascular Plant	DELPHINIUM BICOLOR	FLATHEAD LARKSPUR		G4G5		S1			OR-SEN	D	S
Vascular Plant	ELATINE BRACHYSPERMA	SHORT SEEDED WATERWORT		G5		S1			OR-SEN	S	N
Vascular Plant	ELEOCHARIS BOLANDERI	BOLANDER'S SPIKERUSH		G4		S2			OR-SEN	S	S
Vascular Plant	ERIGERON DISPARIPILUS	WHITE CUSHION ERIGERON		G5		S2			OR-SEN	D	D
Vascular Plant	ERIGERON ENGELMANNII VAR. DAVISII	ENGELMANN'S DAISY		G5	T3	S1			OR-SEN	D	D
Vascular Plant	GENTIANA PROSTRATA	MOSS GENTIAN		G4G5		S2			OR-SEN	S	N
Vascular Plant	GENTIANELLA TENELLA SSP. TENELLA	SLENDER GENTIAN		G4G5	T4	S1			SEN	S	N
Vascular Plant	GEUM ROSSII VAR. TURBINATUM	SLENDER-STEMMED AVENS		G5	T4	S2			OR-SEN	D	N
Vascular Plant	HELIOTROPIMUM CURASSAVICUM	SALT HELIOTROPE		G5		S2			OR-SEN	S	N
Vascular Plant	ISOETES MINIMA	MIDGET QUILLWORT		G1G2		S1?			OR-STR	D	S
Vascular Plant	JUNCUS TRIGLUMIS VAR. ALBESCENS	THREE-FLOWERED RUSH		G5	T5	S1			OR-SEN	D	N
Vascular Plant	KOBRESIA MYOSUROIDES	BELLARD'S KOBRESIA		G5		S1			OR-SEN	D	N
Vascular Plant	KOBRESIA SIMPLICIUSCULA	SIMPLE KOBRESIA		G5		S1			OR-SEN	D	N

Vascular Plant	LIPOCARPHA ARISTULATA	ARISTULATE LIPOCARPHA		G5?		S1			SEN	D	N
Vascular Plant	LISTERA BOREALIS	NORTHERN TWAYBLADE		G4		S1			OR-SEN	D	S
Vascular Plant	LOMATIUM ERYTHROCARPUM	RED-FRUITED LOMATIUM		G1		S1		SE	OR-SEN	D	N
Vascular Plant	LOMATIUM GREENMANII	GREENMAN'S DESERT PARSLEY		G1		S1		ST	OR-SEN	D	N
Vascular Plant	LYCOPodium COMPLANATUM	GROUND CEDAR		G5		S2			OR-SEN	D	N
Vascular Plant	MIMULUS HYMENOPHYLLUS	MEMBRANE-LEAVED MONKEYFLOWER		G1		S1		SC	OR-SEN	D	S
Vascular Plant	MIRABILIS MACFARLANEI	MACFARLANE'S FOUR O'CLOCK	FT	G2		S1		SE	FT	D	N
Vascular Plant	MUHLENBERGIA MINUTISSIMA	ANNUAL DROPSEED		G5		S2			OR-SEN	S	S
Vascular Plant	OPHIOGLOSSUM PUSILLUM	ADDER'S-TONGUE		G5		S1			SEN	D	N
Vascular Plant	PELLAEA BRIDGESII	BRIDGES' CLIFF-BRAKE		G4		S2			OR-SEN	D	N
Vascular Plant	PHACELIA MINUTISSIMA	DWARF PHACELIA		G3		S1		SC	SEN	D	S
Vascular Plant	PHLOX MULTIFLORA	MANY-FLOWERED PHLOX		G4		S1			OR-SEN	D	S
Vascular Plant	PINUS ALBICAULIS	WHITEBARK PINE	FC	G3G4		S4			SEN	D	N
Vascular Plant	PLATANThERA OBTUSATA	SMALL NORTHERN BOG-ORCHID		G5		S1			SEN	D	N
Vascular Plant	PLEUROPOGON OREGONUS	OREGON SEMAPHOREGRASS		G1		S1		ST	OR-SEN	S	S
Vascular Plant	POTAMOGETON DIVERSIFOLIUS	RAFINESQUE'S PONDWEED		G5		S1			OR-SEN	S	N
Vascular Plant	PYRROCOMA SCABERULA	ROUGH PYRROCOMA		G3		S2			OR-SEN	D	D

Vascular Plant	RORIPPA COLUMBIAE	COLUMBIA CRESS		G3		S3		SC	SEN	S	S
Vascular Plant	ROOTALA RAMOSIOR	LOWLAND TOOTH CUP		G5		S2			SEN	S	S
Vascular Plant	RUBUS BARTONIANUS	BARTONBERRY		G2		S2		SC	OR-SEN	D	N
Vascular Plant	SALIX FARRIAE	FARR'S WILLOW		G4		S2			OR-SEN	D	N
Vascular Plant	SALIX WOLFII	WOLF'S WILLOW		G5?		S2			OR-SEN	D	N
Vascular Plant	SAXIFRAGA ADSCENDENS SSP. OREGONENSIS	WEDGE-LEAF SAXIFRAGE		G5	T4T5	S1			OR-SEN	D	N
Vascular Plant	SILENE SPALDINGII	SPALDING'S CATCHFLY	FT	G2		S1		SE	FT	D	S
Vascular Plant	SUKSDORFIA VIOLACEA	VIOLET SUKSDORFIA		G4		S1			OR-SEN	S	S
Vascular Plant	THALICTRUM ALPINUM	ALPINE MEADOWRUE		G5		S2			OR-SEN	D	N
Vascular Plant	THELYPODIUM EUCOSMUM	ARROW-LEAF THELYPODY		G2		S2		ST	OR-SEN	S	N
Vascular Plant	TOWNSENDIA MONTANA	MOUNTAIN TOWNSENDIA		G4		S1			OR-SEN	D	N
Vascular Plant	TOWNSENDIA PARRYI	PARRY'S TOWNSENDIA		G4?		S1			OR-SEN	D	N
Vascular Plant	TRIFOLIUM DOUGLASII	DOUGLAS' CLOVER		G2		S1			SEN	D	S
Vascular Plant	TROLLIUS LAXUS SSP. ALBIFLORUS	AMERICAN GLOBEFLOWER		G4	T4	S1			OR-SEN	D	N
Vascular Plant	UTRICULARIA MINOR	LESSER BLADDERWORT		G5		S2			OR-SEN	S	N
Bivalva: Clams, Oysters & Mussels	GONIDEA ANGULATA	WESTERN RIDGED MUSSEL		G3		S2S3			SEN	S	S

Gastropoda: Snails & Slugs	CRYPTOMASTIX POPULI	HELLS CANYON LAND SNAIL		G2		S1			SEN	S	N
Gastropoda: Snails & Slugs	FISHEROLA NUTTALLI	SHORTFACE LANX		G2		S1S2			OR-SEN	D	N
Gastropoda: Snails & Slugs	FLUMINICOLA FUSCUS	COLUMBIA PEBBLESNAIL		G2		S1			OR-SEN	D	N
Gastropoda: Snails & Slugs	RADIODISCUS ABIETUM	FIR PINWHEEL		G4		S1			SEN	D	N
Gastropoda: Snails & Slugs	TAYLORCONCHA SERPENTICOLA	BLISS RAPID SNAIL	FT	G1					FT	D	N
Order Hymenoptera: Ants, Bees & Wasps	BOMBUS OCCIDENTALIS	WESTERN BUMBLEBEE		GU		S1S2			OR-SEN	D	S
Order Lepidoptera: Butterflies & Moths	BOLORIA SELENE	SILVER-BORDERED FRITILLARY		G5		S2			OR-SEN	D	N
Order Lepidoptera: Butterflies & Moths	CALLOPHRYS JOHNSONI	JOHNSON'S HAIRSTREAK		G3G4		S2			SEN	S	S
Order Lepidoptera: Butterflies & Moths	COLIAS CHRISTINA PSEUDOCRISTINA	INTERMOUNTAIN SULPHUR		G3G4	T2T4	S2			OR-SEN	D	S
Order Lepidoptera: Butterflies & Moths	OCHLODES YUMA	YUMA SKIPPER		G5		S1?			OR-SEN	D	N

Key to codes:

**Rank and Status Information:**

Global (G), National (N) and Subnational (State/Province) (S) Ranks:

1 = Critically imperiled

2 = Imperiled

3 = Rare and uncommon; vulnerable.

4 = Not rare and apparently secure

5 = Demonstrably widespread, abundant and secure

U = Unrankable

H = Possible extinct; Historical occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered

X = Presumed extinct

NR = Not yet ranked

Rank Qualifiers:

? = Inexact numeric rank

Q = Questionable taxonomy

C = Captive or Cultivated only

**Breeding Status Qualifiers:**

B = Breeding, conservation status refers to breeding population of the species in the nation or state/province

N = Non-breeding, conservation status refers to the non-breeding population of the species in the nation or state/province.

M = Migrant, migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention

**Subspecies Rank (T = trinomial):**

T# = Status of a infraspecific taxon (subspecies or varieties) are indicated by a T-rank following the species' global rank.

Rules for assigning T-ranks follow the same definitions for Global, National and Subnational/State ranks.

**Oregon Biodiversity Information Center (ORBIC) List Rank:**

1 = contains taxa that are threatened with extinction or presumed to be extinct throughout their entire range

2 = contains taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon;

these are often peripheral or disjunct species which are of concern when considering species diversity within Oregon's borders.

3 = contains taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range

4 = contains taxa which are of conservation concern but are not currently threatened or endangered

## Appendix F - U.S. Forest Service Habitat descriptions for Region 6 Sensitive Plants documented or suspected to occur in the LJCRP

Habitat Group	Species	Common name	Habitat
Coniferous forest	<i>Buxbaumia aphylla</i>	bug on a stick moss	A pioneer on dry, mineral-poor soil and well-decayed wood, in exposed to shaded sites in forests, cutbanks of trails and roads, and recovering burns. In Oregon and Washington, elevation mostly 4000-6000 feet. Forest associations include <i>Pinus contorta</i> , <i>Pseudotsuga menziesii</i> , <i>Tsuga heterophylla</i> . No canopy to closed canopy, and forest age class does not seem to be important.
	<i>Carex cordillerana</i>	Cordilleran sedge	Naturally disturbed rocky slopes with organic layer and leaf litter in mesic mixed forests, or disturbed, open grassy slopes. Moist, shady woods; warm-moist plant associations.
	<i>Cypripedium fasciculatum</i>	clustered lady's slipper	Mixed conifer stands, mesic forests, around springs. Forest, grand fir to Ponderosa pine, and warm riparian forests.
	<i>Listera borealis</i>	Northern twayblade	Moist, humus or mossy mixed conifer or (cool-moist) hardwood forests, swamps, often along cold streams
	<i>Ptilidium pulcherrimum</i>	naugehyde liverwort	On trunks and branches of living trees and shrubs; or more rarely on decaying wood, among boulders in talus slopes, ledges of cliffs, and very rarely on soil, but generally in cool moist habitats between 3800 and 8000 feet on the W-W NF so would include <i>Pseudotsuga menziesii</i> , <i>Abies grandis</i> , <i>Abies lasiocarpa</i> , and <i>Picea engelmannii</i> associations
	<i>Rhizogogon subclavatisporus</i>	truffle	In duff under mixed conifers, mycorrhizal
	<i>Rhizopogon bacillisporus</i>	truffle	Mycorrhizal on conifers, coniferous forest
	<i>Schistostega pennata</i>	goblin's gold (moss)	In soil on root wads of fallen trees; on damp, acidic rock, soil and decaying wood, in dark places, such as openings of caves and mine shafts, crevices, overhangs. Often pioneer on disturbed soil. In ID, on root-wads sometimes in sunny areas.
	<i>Tetraphis geniculata</i>	bent stem moss	On the cut ends and sides of well decayed logs and stumps, occasionally on peaty banks; moist conif. forests. Rarely on rocks. In mature to late seral forests with closed canopies. Found from sea level to subalpine elevations.
Grassland	<i>Calochortus macrocarpus</i> v. <i>maculosus</i>	green-band mariposa lily (Nez Perce mariposa lily)	Dry plains, rocky slopes, sagebrush scrub, pine forests, usually in volcanic soil; 300-2700 m (18). Dry grasslands, ridge tops. In rocky, basaltic derived soils, on hillsides, rock outcrops and cliff bands. In grasslands on steep slopes.
	<i>Pyrrocoma scaberula</i>	rough pyrrocoma	Mesic canyon grasslands (ID fescue) with deep soil and transition zones between grasslands & P-pine communities
	<i>Carex duriuscula</i>	needleleaf sedge	Dry prairie, sagebrush steppe, open forest
	<i>Delphinium bicolor</i>	flathead larkspur	Dry meadow edges, sage scrub, open woodlands and edges. Seepy areas in dry forest.

	<i>Silene spaldingii</i>	Spalding's catchfly	Deep-soiled grasslands, often w/Idaho fescue, sometimes on fringes of Ponderosa Pine forest. Soils are loess over basalt and sometimes gravelly.
Moist meadow	<i>Allium geoyeri</i> v. <i>geoyeri</i>	Geyer's onion	Moist, open slopes, meadows, or stream banks or summer-dry grasslands at low to mid elevation
	<i>Botrychium crenulatum</i>	crenulate moonwort	Moist woodlands, meadows, & grassy roadsides.
	<i>Botrychium hesperium</i>	western moonwort	Mid to high elevation open-canopied forests, also in gravelly soils, or open meadows.
	<i>Botrychium lunaria</i>	moonwort	Open (to lightly wooded) meadows as well as scree slopes, mesic woodlands on moist but well-drained soils with a neutral pH
	<i>Botrychium pedunculatum</i>	stalked moonwort	Mountain meadows, roadside meadows, brushy secondary woodlands, and open to closed canopy forests.
	<i>Phacelia minutissima</i>	dwarf phacelia	Moist meadow and seep edges, or on vernal wet open meadows and barren slopes. Reported to occur with aspen in other areas. Gravelly, clay-loam, well-drained soils.
	<i>Trifolium douglasii</i>	Douglas' clover	Moist or mesic meadows, prairie remnants, along riparian areas along streams. In swales, along intermittent streams, and in vernal wet areas. Alluvial soils, ash/clay, fine silt to sandy.
	<i>Muhlenbergia minutissima</i>	annual dropseed	Sandy riverbanks, moist meadows, or open and rocky and apparently dry slopes (9). Open, more or less disturbed, sandy slopes and seeps, 400-2300 m..

Habitat Group	Species	Common name	Habitat
Rock outcrops, talus, scree	<i>Arabis hastatula</i>	Hell's Canyon rockcress	Basalt outcrops/cliffs; moderate to high elevations, within cold forest
	<i>Anomobryum filiforme</i>	moss	Damp outcrops in or near temperate forests, earth cliff crevices, cliff crevices, on tussock tundra with seeps and late snow melt areas, and on granitic outcrops
	<i>Encalypta brevipes</i>	candle-snuffer moss	Soil on ledges and in crevices on cliffs, reported from both igneous and siliceous substrates - various elevations
	<i>Mimulus hymenophyllus</i>	membrane-leaved monkey flower	Steep moist soil and seeps and seeping cracks in basalt and limestone in low elevation canyons
	<i>Suksdorfia violacea</i>	violet mock brookfoam	In moss on wet cliffs, cracks of moist talus slopes, on basalt. Habitat sometimes is only wet in the spring.
	<i>Tortula mucronifera</i>	moss	On soil, tree roots, and sheltered ledges and crevices of rock outcrops and cliffs. Elevation of known sites ranges from 5000-7000 feet. Known vegetation types are rock outcrops in Abies forest in SW Oregon, and riparian forest on Steens Mountain composed of <i>Betula occidentalis</i> , <i>Populus tremuloides</i> , and <i>Populus trichocarpa</i> . Reportedly a calciphile but in Oregon and Washington on acid rocks as well.
	<i>Phlox multiflora</i>	many-flowered phlox	Basalt cliffs, rocky outcrops, rocky openings in dry forest. Wooded rocky areas, as well as in openings in the forest. Loose substrate rather than exposed hard rocks. Residual soils, gravels, cobbles.

Habitat Group	Species	Common name	Habitat
Lithosols	<i>Achnatherum wallowaensis</i>	Wallowa ricegrass	Often with rigid sagebrush in dry grasslands & scablands (lithosolic substrates) at mid elevations
	<i>Erigeron disparipilus</i>	Snake River daisy	In dry grasslands and shallow soiled plateaus and ridges / ridge shoulders and rocky slopes at mid elevations
	<i>Erigeron englemannii</i> v. <i>davisii</i>	Davis fleabane	In dry grasslands and shallow soiled plateaus and ridges / ridge shoulders and rocky slopes at mid elevations
	<i>Thelenella muscorum</i> v. <i>octospora</i>	lichen	A component of biological soil crusts in semi-arid shrub-steppe and grassland below elevations of 4,000 feet. Vegetation types are <i>Juniperus occidentalis</i> , <i>Artemisia rigida</i> , and <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> associations with <i>Festuca idahoensis</i> , <i>Poa secunda</i> , and <i>Pseudoroegneria spicata</i> . But also On soil, rock, and dead or dying mosses and lichens in dry woodland, prairie, shrub-steppe, and subalpine forest, up to 11,000 feet elevation
Springs and seeps	<i>Eleocharis bolanderi</i>	Bolander's spikerush	Mid elevation summer-dry meadows, springs, seeps, ephemeral stream margins
	<i>Entosthodon fascicularis</i>	moss	On seasonally wet, exposed soil in seeps or along intermittent streams. It is usually hidden among grasses, other mosses, and litter, and periodically on humid or damp earth of terraces of exposed rock outcrops & may be found on recently disturbed soil & occasionally present on thin soil overlying limestone; found below 3,000 feet.
	<i>Isoetes minima</i>	midget quillwort	Damp, bare places on prairies, on damp ground. Locally common in saturated soil

Habitat Group	Species	Common name	Habitat
Wet meadow/ riparian	<i>Botrychium montanum</i>	Mountain grape-fern	Dark, coniferous forests, usually near swamps and streams; 1000-2000 m (18). Wet meadows, saturated soils. Often growing in a bed of mosses. This species tends to grow in wetter sites than the other Botrychiums.
	<i>Pleuropogon oregonus</i>	Oregon semaphore grass	Elev. 900-1600 m (22). Open, wet meadows, marshes, and riparian areas. Grows in areas of standing or flowing water early in season. Documented sites are not near forested habitats. Sluggish water in depressions and sloughs. Irrigation ditches in S. OR.
	<i>Rorippa columbiae</i>	Columbia cress	Stream banks, ditches, margins of lakes and ponds, meadows, roadsides, gravel bars, wet fields. Low to moderate elevations.
	<i>Rotala ramosior</i>	Lowland toothcup	Damp, bare places on prairies, on damp ground. Locally common in saturated soil
	<i>Sphlachnum ampullaceum</i>	moss	Forming green sods on old dung of herbivores, or on soil enriched by dung (completely humified), in bogs, peatlands or other wetlands - from 500 to 5000 feet elevation

## Appendix G - Consultation and coordination log, Nez Perce Tribes (NPT) and the Forest Service

Key to acronyms: TRL = Tribal Relations Liaison; NPT = Nez Perce Tribe; NPTEC = Nez Perce Tribes Executive Counsel; THPO = Tribal Historic Preservation Officer

Date	Contact/Consultation Type	Topic	Parties Involved	Outcome/Actions
08-28-13	Field Tour Information sharing	LJCRP existing condition and restoration treatment needs	W-W collaborative, FS, NRAC, NP staff, public	TRL met NPT Acting Fisheries Program Director. Received information on who to work with to begin LJCRP staff to staff coordination
09-30-13	Phone call	Request to coordinate briefing regarding 3 Blue Mountains Landscape Restoration projects i.e. LJCRP, Strategic Fuels Reduction and Dry Forest Restoration Projects	TRL and NPT Acting Fisheries Program Director	Received names and contact information for NPT Legal Counsel and NPT Natural Resource Director
11-05-13	Formal Letter	From 4 Blue Mountains Forest Supervisors i.e. Wallowa-Whitman, Ochoco, Umatilla and Malheur National Forests requesting coordination to initiate Govt-Govt consultation regarding 3 Blue Mountains projects	Forest Supervisors, TRL, NPTEC, NPT Directors and Staff	Received
11-06-13	Email/phone calls	Schedule briefing for 3 Blue Mountains Landscape Restoration projects i.e. LJCRP, Strategic Fuels Reduction and Dry Forest Restoration Projects	TRL, NPT Legal Counsel and NPT Natural Resource Director	Check calendars and NPTEC Sub Committee agenda and get back later.
11-19-13	NPTEC Natural Resource Sub-Committee Meeting	Team Leader and TRL briefing for Blue Mountain projects i.e. LJCRP, Strategic Fuels Reduction and Dry Forest Restoration Projects	NR Committee, NR Director and staff	Agreement to review and initiate Govt-Govt consultation in near future
01-08-14	Staff to Staff meeting	Wallowa-Whitman NF SOPA review including LJCRP	District Ranger ,staff, LJCRP IDT members and NPT staff	LJCRP briefing, issues and concerns shared, introductions and discussion of how NPT staff and IDT will work together
01-22-14	Wallowa-Whitman Collaborative	Review and discuss status of LJCRP environmental analysis	Members of public and collaborative. Nez Perce staff joined via	Tribal staff concerned about apparent lack of understanding of trust responsibilities

	Meeting. La Grande RD		con call	
02-12-14	Conference call	NPT THPO cultural resource interest in conducting archaeological survey for LJCRP	Forest Archaeologist, District Archaeologist, TRL and NPT THPO	TRL look into contract authorities
02-21-14	Conference call	LJCRP planning update; discuss historic range of variability and alternative development	IDT Lead, TRL, NPT staff i.e. THPO, Botanist, Biologist and Planner	Information sharing
03-03-14	IDT meeting Conference call	LJCRP analysis update i.e. proposed indicators and measures and themes for alternatives	Wallowa County NRAC, IDT, Wallowa-Whitman Forest Collaborative lead, NPT planner	Info requests for maps showing land allocations, RCHAs relative to units, wildlife corridors, heritage, wildlife, botany surveys.
03-04-14	Conference call	NPT THPO interest in sole source contracting for cultural resources inventories	FS Contract Officer, TRL and NPT THPO	No agreement
03-04-14	Conference call	Follow up with tribal staff per 01-013-14 meeting. Roads, IRAs, Old growth issues, RCHAs	IDT members and NPT THPO, planning and biology staff	Agreed to meet face to face to move forward with coordination
03-13-14	Video Tele-conference and face to face meeting in Clarkston	Look at alternatives and explore options. Discuss how work together	IDT members and NPT THPO, planning, botany and wildlife staff	NPT staff want IDT to address tribal interests and sensitivities
03-14-14	Follow up on NPT staff 3/13 request for copies of LJCRP public comments	LJCRP public comments	NPT planning staff	FedEx 2 copies to NPT staff
03-17-14	IDT Conference call	Updates on data collection, models, HRV, effects	NPT botanist	Continue consultation/IDT participation

03-27-14	IDT meeting conference call	Finalize alternatives	Wallowa County NRAC, IDT, Wallow- Whitman Forest Collaborative lead, NPT planner, biologist and botanist	Alternatives developed to compare outcomes of varying levels of treatments per resource concerns
04-15-14	Email	Government-Government consultation scheduling	Deputy Forest Supervisor and NPT legal counsel	Pending schedules
04-29-14	Conference call	June 24 staff to staff LoJo field trip. NPT staff concerned why no recent engagement	IDT members and NPT planning, wildlife and botany staff	Identified field trip locations and next face to face meeting for May 12 in Joseph
05-12-14	Staff to staff meeting at Tribal Fisheries office in Joseph	Field trip planning, status of analysis, Alternatives themes and comparison discussion	IDT members and NPT planning, fisheries and botany staff	Ongoing
05-27-14	Phone conversation	Heritage Resource Inventory/NHPA Compliance	TRL and Guy Moura, Confederated Tribes of Colville THPO	TRLto share inventory results with THPO when complete
06-16-14	Field Trip	Reviewed and discussed cultural and other traditional resources in the LJCRP	THPO, NPT ethnographer, TRL, Zone Archaeologist	Ongoing coordination
06-24-14	Field Trip	Reviewed proposed actions in the LJCRP	IDT and tribal staff	Agreement to continue coordination
07-08-14	Meeting	Government to Government consultation to discuss LJCRP tribal issues and concerns	Forest Supervisor, IDT lead, TRL and NPTEC	Continue staff to staff coordination. Address interests in EIS
09-24-14	Field Trip	Review types of treatments proposed in RCHA's	Tribal staff and IDT	Ongoing coordination
10-24-14	Field Trip	Review types of treatments in Inventoried Roadless areas and MA15	Tribal staff and IDT	Ongoing coordination

## Appendix H. Non-native invasive plants documented in LJCRP area.

Scientific Name	Common Name	ODA <sub>1</sub>	Wallowa County <sub>2</sub>	utilization response <sub>3</sub>	fire adaptations <sub>4</sub>	Wetland Status <sub>5</sub>	Habitat Type	High Priority? <sub>6</sub>	Acres <sub>7</sub>
<i>Aegilops cylindrica</i>	jointed goat grass	B	A	IU	invader	UPL	Open areas	No	0.01
<i>Arctium minus</i>	common burdock		B	IU	invader	FACU	Open Areas	No	S
<i>Bromus tectorum</i>	cheatgrass			IU	invader	FACU	Rangeland	No	S
<i>Cardaria draba</i>	white top	B		IU	invader, sprouter	UPL	Open Areas	Yes	0.01
<i>Centaurea cyanus</i>	bachelor button		W	IU	invader	FACU	Open Areas	No	S
<i>Centaurea diffusa</i>	diffuse knapweed	B	B	IU	sprouter	UPL	Open Areas	No	173
<i>Centaurea maculosa</i>	spotted knapweed	B	A	IU	sprouter	FACU	Open Areas	No	126
<i>Centaurea solstitialis</i>	yellow starthistle	B	A	IU	invader	FACU	Rangeland	No	66
<i>Chondrilla juncea</i>	rush skeletonweed	B	A	IP	invader, sprouter	UPL	Rangeland	Yes	0.4
<i>Cichorium intybus</i>	chicory		B	IP	invader	FACU	Open Areas	No	S
<i>Cirsium arvense</i>	Canada thistle	B	B	IU	invader, sprouter	FACU	Mesic Openings	No	54
<i>Cirsium vulgare</i>	bull thistle	B	B	IU	invader	FACU	Open Areas	No	284
<i>Conium maculatum</i>	hemlock	B	A	IU	avoider	FACW	Mesic Openings	No	S
<i>Convolvulus arvensis</i>	field bindweed	B	B	IU	invader	UPL	Open Areas	No	S
<i>Crupina vulgaris</i>	common crupina		A	IU	invader	UPL	Rangeland	No	S
<i>Cynoglossum officinale</i>	hounds tongue	B	B	IU	invader	FACU	Open Areas	No	S
<i>Dipsacus fullonum</i>	teasel		B	IU	sprouter	FAC	Open Areas	No	S
<i>Hieracium aurantiacum</i>	orange hawkweed	A	A	IU	sprouter	FACU	Mesic Openings	Yes	10
<i>Hieracium pratense</i>	meadow knapweed		A	IU	sprouter	FACU	Mesic Openings	Yes	2385
<i>Hypericum perforatum</i>	St. Johnswort	B	B	IU	sprouter	FACU	Open Areas	No	S
<i>Kochia scoparia</i>	kochia	B	B	IP* toxic	invader	FAC	Open Areas	No	S
<i>Linaria dalmatica</i>	Dalmation toadflax	B	B	IP	sprouter	UPL	Rangeland	No	S

Onopordum acanthium	Scotch thistle	B	A	IU	invader	FAC	Mesic Openings	No	440
Phalaris arundinacea	reed canary grass		B	IP	avoider	OBL	Mesic Openings	No	S
Potentilla recta	sulfur cinquefoil	B	A	IU	sprouter	FACU	Open Areas	No	7
Ranunculus acris	tall buttercup		B	IU	sprouter	FACW	Mesic Openings	No	S
<b>Scientific Name</b>	<b>Common Name</b>	<b>ODA<sub>1</sub></b>	<b>Wallowa County<sup>2</sup></b>	<b>utilization response<sub>3</sub></b>	<b>fire adaptations<sup>4</sup></b>	<b>Wetland Status<sup>5</sup></b>	<b>Habitat Type</b>	<b>High Priority?<sub>6</sub></b>	<b>Acres<sub>7</sub></b>
Ranunculus testiculatus	bur buttercup		B	IU	invader	UPL	Open Areas	No	S
Rosa eglanteria	sweet briar rose		B	IU	sprouter	FACU	Open Areas	No	S
Rubus discolor	blackberry	B	B	IU	sprouter	FACU	Open Areas	No	S
Senecio jacobaea	tansy ragwort	B	A	IU	sprouter	FACU	Mesic Openings	No	5.5
Silene alba	white campion		B	IU	invader	UPL	Open Areas	No	S
Taeniatherum caput-medusae	medusahead rye	B	A	IU	invader	UPL	Rangeland	No	0.5
Ventenata dubia	ventenata		B	IU	invader	UPL	Rangeland	No	S
Verbascum thapsus	mullein		B	IU	seeder	FACU	Open Areas	No	S

1/ Oregon Department of Agriculture codes: A = a weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent; B = a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties

2/ Wallowa County Codes: “A” Designated Weed – a weed of known economic importance which occurs in the county in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring counties make future occurrence in Wallowa County seem imminent.

“B” Designated Weed – a weed of economic importance which is regionally abundant, but which may have limited distribution in some areas. “W” Watch List - Weeds that are known or are likely to occur in Wallowa County that have economic or ecological importance but, for whatever reason have not been given the emphasis of rating as an A or B Noxious Weed are listed in the Watch List. (Wallowa County Weed Board 2010).

3/ The Blue Mountain Ecology program, NRCS Plants, and the Oregon Department of Agriculture (ODA) databases were queried for information on utilization response, fire adaptations, and wetland status. Utilization response (response to grazing): IU = increases with utilization and is unpalatable, IP increases and is palatable.

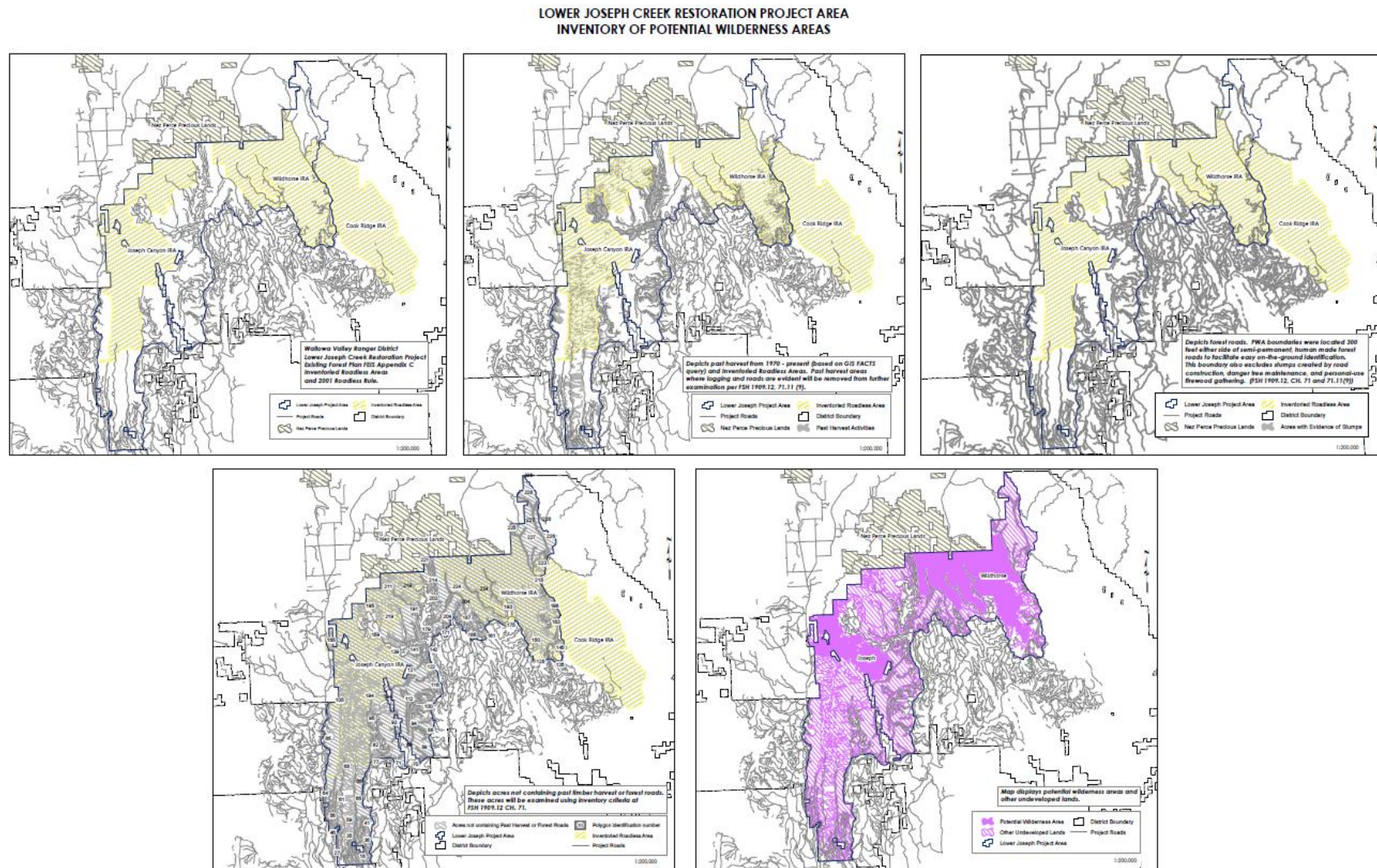
4/ Fire adaptations: invader = comes in after fire and thrives in post fire conditions, sprouter = survives and resprouts after fire, seeder = regenerates from copious seed after fire, avoider = occupies habitats rarely visited by fire.

5/ Wetland Status: UPL = upland, FACU = facultative upland, FACW = facultative wetland, OBL = obligate wetland

6/ This column refers to whether the species is considered a high priority for eradication by the Wallowa Mountains District of the Wallowa-Whitman National Forest.

7/ Species without acres listed have been observed in the project area but not documented in the NRM database.

## Appendix I - Analysis process used to identify potential wilderness areas, and other undeveloped lands



## Appendix J - Project Design Features, Mitigation Measures and Best Management Practices

### Project Design Features

Wildlife																			
<b>Wildlife– 1</b>	To maintain wildlife connectivity corridors in the Dry Forest treatment units maintain $\geq 40$ canopy closure. In the Moist Forest connectivity treatment units maintain $\geq 50\%$ canopy closure.																		
<b>Wildlife – 2</b>	<p>Develop burning prescriptions that retain and recruit logs within the standards set in the Eastside Screens. These standards are as follows:</p> <p>Table 5. Burning prescriptions following Eastside Screen Standards for retention and log recruitment</p> <table border="1"> <thead> <tr> <th>Species</th><th>Pieces per Acre</th><th>Diameter at Small End (inches)</th><th>Piece Length (feet)</th><th>Total Lineal Length (feet)</th></tr> </thead> <tbody> <tr> <td>Ponderosa pine</td><td>3-6</td><td>12</td><td><math>&gt;6</math></td><td>20 to 40</td></tr> <tr> <td>Mixed conifer</td><td>15-20</td><td>8</td><td><math>&gt;8</math></td><td>120 to 160</td></tr> </tbody> </table>				Species	Pieces per Acre	Diameter at Small End (inches)	Piece Length (feet)	Total Lineal Length (feet)	Ponderosa pine	3-6	12	$>6$	20 to 40	Mixed conifer	15-20	8	$>8$	120 to 160
Species	Pieces per Acre	Diameter at Small End (inches)	Piece Length (feet)	Total Lineal Length (feet)															
Ponderosa pine	3-6	12	$>6$	20 to 40															
Mixed conifer	15-20	8	$>8$	120 to 160															
<b>Wildlife – 3</b>	<p>To protect any known goshawk nest sites or any discovered during unit marking, delineate a 30 acre nest area that includes goshawk foraging habitat. No tree cutting will occur in the 30 acre nest area. Maintain understory shrubs and forbs, and retain down woody material (Reynolds <i>et al.</i> 1992 and Reynolds <i>et al.</i> 2008).</p> <p>Seasonal restrictions of harvest activities are required within <math>\frac{1}{2}</math> mile of goshawk nest sites during the nesting season from March 1 through August 30. This restriction should be extended to not later than September 30 if monitoring indicates that fledglings are still present in the nest stand after August 30</p>																		
<b>Wildlife – 4</b>	Goshawk PFA - Under burning and prescribed fire-only treatments within the goshawk PFA will be implemented outside the nesting period (after July 31).																		
<b>Wildlife – 5</b>	A 400-acre “Post Fledging Area” (PFA) will be established around every known active nest site. While harvest activities can occur within this area, retain the LOS stands and enhance younger stands towards LOS condition, as possible.																		
<b>Wildlife –6</b>	To protect any raptor nests discovered during unit marking, implementation of disturbing activities will only occur after the young have fledged and are mobile at the end of August. This restriction should be extended to not later than September 30 if monitoring indicates that fledglings are still present in the nest stand after August 30.																		

<b>Wildlife –7</b>	To maintain foraging and perching habitat for cavity excavators, retain all snags 9 inches in diameter or greater unless specific snags must be removed to provide for operator safety during tree removal activities..
<b>Wildlife –8</b>	To provide for old-growth associated species, protect all snags greater than 20 inches prior to under-burning by removing fuels from the base of these snags prior to ignition. Where feasible, ignite fire a few feet from the snags to create “black” immediately around them as designated by a qualified fuels specialist.
<b>Wildlife –9</b>	To prevent spread of diseases to amphibians including Rock Mountain tailed frog, gear, hoses and dipping buckets used to transport or move water from streams, rivers, or ponds needs to be disinfected by drying in the sun (must be completely dry inside and out) or washing with a chemical disinfectant before changing to a different water source.
<b>Wildlife –10</b>	Pileated Woodpecker, White-headed Woodpecker, Flammulated Owl Nest sites – Ensure that any known/ discovered nest tree is protected from harvest and during implementation of prescribed fire-only treatments . Also, conduct prescribed fire treatments within these stands outside the nesting season (after July 31), unless the nest tree is known to be unoccupied.
<b>Wildlife –11</b>	Raptors -Any raptor sightings or active raptor nests observed during reconnaissance, layout, marking, or project activities will be reported to the Unit Wildlife Biologist for further assessment and potential mitigation associated with project activities
<b>Wildlife –12</b>	Big Game Winter Range -Logging operations in Big Game Winter Range will be conducted outside the period between December 15 through April 30.
<b>Wildlife –13</b>	Landbirds and Neotropical Migratory Birds - To reduce the potential for loss of snags during prescribed burning, employ passive lighting techniques near snags larger than 12 inches. Techniques include lighting at a slope position above snags, and avoid lighting directly adjacent to or at slope positions directly below snags. For larger snags (> 20 inches DBH) at higher risk due to heavy fuels accumulations at the base, pullback of fuels may be necessary prior to prescribed burning.
<b>Wildlife –14</b>	Landbirds and Neotropical Migratory Birds -To reduce the potential for impacts to nesting landbirds, prescribed burning activities projected to occur on or after May 20, and/or past the onset of vegetation leaf-out, will be reviewed by a district or forest wildlife biologist. The biologist will then provide recommendations concerning prescribed burning after May 20 and/or past the onset of vegetation leaf-out
<b>Wildlife –15</b>	Cavity-nester/Denning Habitat -All cull grand fir will be retained within treatment units.

Threatened, Endangered, and Sensitive Plants	
<b>TESP – 1</b>	No road construction activities, parking, or piling on lithosols, grasslands, meadows.
<b>TESP – 2</b>	Seed disturbed areas according to USFS policy, and with approval of local botanist
<b>TESP – 3</b>	Avoid disturbing natural seeps and springs, wet meadows, moist meadows, this includes removing shrubs and trees.
<b>TESP – 4</b>	Leave tree islands in coniferous forest for conservation of native mycorrhizal fungi, yew, wet areas when these features are found or suspected in units. Mycorrhizae should always be suspected in coniferous forest units.
<b>TESP – 5</b>	Maintain woody debris of all size classes to provide habitat for nonvascular

	plants and fungi
<b>TESP – 6</b>	Avoid yarding over rock outcrops and talus slopes. Leave trees and shrubs adjacent to rock outcrops, talus as a microclimate buffer.
<b>TESP – 7</b>	Although some TES and Invasive plant surveys were conducted, searches were not specific to units on the ground, and clearance needs to be done prior to project activities
<b>TESP – 8</b>	Known TES and INV plant populations will be flagged prior to road grading and other road improvements, designation of parking areas and landings, and logging, with work overseen by District Botanist.
<b>TESP – 9</b>	Equipment operators will receive maps with known TES plant sites and instructions to avoid flagged areas.

Range	
<b>Range – 1</b>	The range manager, botanist, invasive plant program manager, and hydrologist will assess units to determine whether the treated areas will require rest from grazing after implementation.
<b>Range – 2</b>	The range manager will work with the timber sale officer with respect to the timing and location of logging operations. Timber harvest within the project area is not anticipated to impact ongoing grazing operations. All gates must be closed while livestock are within the allotment adjacent to the harvest units.
<b>Range – 3</b>	The range manager will work with fire management to determine timing and location of prescribed fire. Burn blocks should be planned in a manner that does not interrupt planned livestock management on the allotments. All burns will be coordinated with the District Range Management Specialist.
<b>Range – 4</b>	There are numerous range improvements within the project area in addition to private land boundary fences in many locations. All improvements should be protected during timber harvest activities. If it is necessary to cut range fences, the purchaser must be required to immediately repair them to Forest Service standard. These standards are available and should be made a part of the timber sale contract.
<b>Range – 5</b>	No trees used as anchor trees along a fence line shall be marked for harvest.
<b>Range – 6</b>	If it is necessary to cut a fence to enter a harvest unit where livestock are present, the purchaser must be required to close and secure the fence each day at the end of work activities.
<b>Range – 7</b>	If any fences are damaged during burning operations, repairs must be made immediately to prevent livestock from entering areas outside of established allotments.
<b>Range – 8</b>	The botanist, invasive species specialist and range manager will work together to determine whether burning activities will require resting portions of the pasture treated.

Invasive Plants and Noxious Weeds	
<b>INVP – 1</b>	Treat noxious weeds with approved methods as found, prior to logging activities
<b>INVP – 2</b>	Clearance for invasive plant populations will be done prior to project activities. Known invasive plant populations will be flagged prior to road grading and other road improvements, designation of parking areas and landings, and logging, with work overseen by the invasive species specialists. Equipment operators will

Invasive Plants and Noxious Weeds	
	receive maps with known sites and instructions to avoid flagged areas.
<b>INVP – 3</b>	Do not use prescribed fire in areas with greater than 5 % cover of invasive annual grasses. Avoid putting fire through any sized patch of invasive annual grass.
<b>INVP – 4</b>	Do not disturb Meadow Hawkweed in Swamp Creek through ground disturbance that will create bare soil or move seeds or vegetative parts of meadow hawkweed plants to new locations. Machinery used in Swamp Creek Meadow must be washed prior to leaving site.
<b>INVP – 5</b>	Avoid blading through noxious weed populations (road improvement, ditch cleaning, landings)
<b>INVP – 6</b>	All landings, burn piles, and skid trails created as part of a yarding system, would be rehabilitated and seeded as per USFS policy with the input and approval of local botanist
<b>INVP – 7</b>	Actions conducted or authorized by written permit by the Forest Service that will operate outside the limits of the road prism (including public works and service contracts), require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands.
<b>INVP – 8</b>	Use weed-free straw and mulch for all projects, conducted or authorized by the Forest Service, on National Forest System Lands. If State certified straw and/or mulch is not available, individual Forests should require sources certified to be weed free using the North American Weed Free Forage Program standards.
<b>INVP – 9</b>	Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be weed free by District or Forest weed specialists.
<b>INVP – 10</b>	Native plant materials are the first choice in revegetation for restoration and rehabilitation where timely natural regeneration of the native plant community is not likely to occur. Non-native, non-invasive plant species may be used in any of the following situations: 1) when needed in emergency conditions to protect basic resource values (e.g., soil stability, water quality and to help prevent the establishment of invasive species), 2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, 3) if native plant materials are not available, or 4) in permanently altered plant communities. Under no circumstances will non-native invasive plant species be used for revegetation.

Soils	
<b>Soils – 1</b>	Designate and locate skid trails to minimize the area affected by logging operations; use pre-existing skid trails at the discretion of the sale administrator and to the extent feasible. Refer to the RHCA section of the LJCRP Implementation Plan for skid trail design parameters and mechanized equipment operation adjacent to RHCA.
<b>Soils – 2</b>	No mechanized equipment should operate within RHCA's with slopes exceeding 35%. Under Alternative 2, mechanized equipment
<b>Soils – 3</b>	Use of harvest equipment will not be permitted when soils reach field capacity for moisture, to limit the potential of long-term detrimental soil disturbance
<b>Soils – 4</b>	Placement of new temporary roads will be on deep soils, if it is operationally feasible. This will allow for adequate restoration of temporary roads and over time will leave less

	measurable detrimental soil condition across the proposed activity units. Lithosol (scab flats) and meadows will not be used for landings and skid trails; unless no other location is practical.				
Soils – 5	Criteria for equipment trails in or around Class 4 stream RHCA. Limits are based on WEPP results.				
	Average Buffer Slope %				Allowed Activity
	First 100' from stream edge = 0-20% slope	Yes	Last 100' to 700' with slope < 35%	Yes	Skid trails between and 700' from stre
		Yes	Last 100' to 700' with slope > 35%	No	No skid trails perpendicular to ch
	First 75' from stream edge = 21% to 40% slope	Yes	Last 75' to 300' with slope < 35%	Yes	Skid trails between 7 300' from stream
		Yes	75' to 300' with slope > 35%	No	No skid trails
	First 75' = 40% slope or more	Yes			No skid trails
Soils – 6	The treatment of legacy and created compaction (new and existing temporary roads) within and adjacent to activity units should be evaluated for remediation in accordance with the parameters outlined in the subsoiling section of the LJCRP Implementation Plan. Treatments should be prioritized in units with higher proportion of Detrimental Soils Conditions. Detrimental Soils Conditions should not exceed 20% in any activity unit following management activities.				
	Tribal Relations				
Tribal – 1	Consult with The Nez Perce Tribe in compliance with Trust Responsibility NHPA, AIRFA, EO 13007, EO 13175, and other applicable Executive Orders and legislation, particularly if new information regarding sensitive traditional use sites, or other potential properties within the area of potential effect, are revealed or discovered				
Tribal – 2	Once treatment areas are laid out and marked on the ground, detailed maps of the area will be shared with tribes through on-going consultation to determine if previously unknown sensitive tribal areas could be potentially impacted.				
Tribal – 3	The Forest will share operations schedules and treatment locations with the Tribes prior to management activities in an effort to avoid timing conflicts with, or impacts to, traditional uses such as plant gathering, hunting and fishing, ceremonial uses or family gatherings . Eligible, or potentially eligible, heritage resource properties (or sites) will be managed to achieve a “no effect” or “no adverse effect” determination whenever possible, in consultation with the				

	Oregon State Historic Preservation Office (SHPO) and Advisory Council for Historic Preservation [ACHP (36 CFR 800)].
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Heritage Resources	
<b>Heritage – 1</b>	Eligible, or potentially eligible, heritage resource properties (or sites) will be managed to achieve a “no effect” or “no adverse effect” determination whenever possible, in consultation with the Oregon State Historic Preservation Office (SHPO) and Advisory Council for Historic Preservation [ACHP (36 CFR 800)].
<b>Heritage – 2</b>	No effect to Heritage resources will be addressed through site avoidance strategies and other site management measures agreed to by the 2004 Programmatic Agreement (PA) between the Region 6 Forest Service, Oregon SHPO and the ACHP.
<b>Heritage – 3</b>	Project leaders or sale administrators shall coordinate with the Zone Archaeologist during lay out and prior to mechanical treatments, such as timber harvest activities and all associated ground disturbance, to ensure all eligible, or potentially eligible sites, are avoided using a 100 foot radius, no-disturbance buffer.
<b>Heritage – 4</b>	In event that properties are located during treatment, the project will be redesigned to ensure that the properties will be avoided as determined by the Zone Archaeologist. Documentation of all located properties will be sent to SHPO. If avoidance procedures are not possible, or if any question exists as to the effectiveness of avoidance, the project shall cease immediately, and the Zone Archaeologist shall consult with the SHPO and ACHP pursuant to 36 CFR Section 800.13(b) to consider the discovery.
<b>Heritage – 5</b>	If bones, artifacts, foundations, or other indications of past human occupation are uncovered during the course of project ground disturbance activities will cease, and the Zone Archaeologist will evaluate site conditions to access need for consultation with Oregon SHPO and Tribes
<b>Heritage – 6</b>	Locate and design landings and roads to avoid, minimize, or mitigate adverse effects to heritage resources
<b>Heritage – 7</b>	Burn plans will be prepared in advance of ignition and approved by the appropriate line officer for each prescribed fire and would be subject to review by a hydrologist, fisheries biologist, botanist, archaeologist, wildlife biologist, range specialist, recreation/lands specialist and silviculturist.
<b>Heritage – 8</b>	The Zone Archaeologist will work with prescribed fire fuels specialists to design and implement mitigation measures to protect historic and prehistoric sites that contain perishable or wooden materials, or that are near rock outcrops containing rock art, shelters or other historic rock features
<b>Heritage – 9</b>	Low intensity/short duration fires are permissible at lithic scatters, can dumps, stone features, earthen features, and sites with deeply buried deposits. No mop up activities allowed within site boundaries
<b>Heritage – 10</b>	Fire control activities shall be restricted to the use of water within the boundaries of Heritage resource sites. If water is not a sufficient control mechanism, the burn block boundary shall be redesigned to avoid impacts to the site.
<b>Heritage – 11</b>	All eligible and unevaluated heritage resources will be avoided when constructing erosion control features such as water bars and check dams

Scenery	
The following design criteria are developed to meet the intent of high to moderate scenic integrity objectives for the viewsheds. Vegetative treatments would meet the established VQO of Preservation, Retention or Partial Retention as viewed from use areas and travelways.	
<b>Scenery – 1</b>	Locate new landings out of seen areas or leave vegetative screen from Concern level 1 roads (OR Highway 3; FS Roads 4602090, 4602120, 4602080).
<b>Scenery – 2</b>	New temporary roads and landings may be evident but must remain subordinate to the shape and pattern of the natural appearing forest canopy.
<b>Scenery – 3</b>	Foreground clearings (not to exceed 2 acres) should not be used frequently but can be used in specific circumstances to treat insect or disease infestations, or to open views to scenic attributes such as a rock formations, large ponderosa pine or components, or views to distant mountain peaks.
<b>Scenery – 5</b>	Skid patterns, slash, soil exposure and stumps should be visually minor or unnoticed.
<b>Scenery – 6</b>	Cut stumps at a height less than 4” in immediate foreground (300’).
<b>Scenery – 7</b>	Slash pile locations would not be located within the immediate foreground, (300’) of Oregon Highway 3.
<b>Scenery – 8</b>	Limit naturally shaped openings to be a maximum of 5 to 10 acres in size with blended edges.
<b>Scenery – 9</b>	Develop marking guidelines to minimize the amount of paint seen from areas of scenic concern. Paint of backside (uphill) of leave trees or paint take trees along immediate foreground of Oregon Highway 3, FS Roads 46, 4602090, 4602120, and 4602080.
<b>Scenery – 10</b>	Pruning tree limbs at variable heights (6’ to 20’) to expose large diameter trees along the Forest Road 3965 for shaded fuel break provide more variety in the foreground.

Vegetation Mangement	
<b>Silv – 1</b>	<b>Design common to all GS, STS, IT and SI Treatments</b>
	<u>Retain and release old trees.</u> <ul style="list-style-type: none"> <li>○ Retain old trees regardless of size or species. These trees are generally over 150 years old.</li> <li>○ Remove young trees within 1 to 2 drip-lines of old PP, WL and DF. Occasional individual large, vigorous trees may be left when they do not interfere with daylighting objective.</li> </ul> <u>Shift tree composition towards fire and drought tolerant species.</u> <ul style="list-style-type: none"> <li>○ Favor ponderosa pine and western larch as leave trees in thinning operations.</li> </ul> <u>Restore a mosaic spatial pattern.</u> <ul style="list-style-type: none"> <li>○ Skips – 1/10 to 1 acre no cut areas. Wet microsites, rocky outcrops, snags, thickets of seedlings/saplings, moist microsite (shade), deadwood/decadence (disturbance pocket), visual (break up viewing distance).</li> <li>○ Openings - .25 to 2 acres. Sinuous/amorphous shape 50-100 feet across at the widest point.</li> </ul>

	<ul style="list-style-type: none"> <li>○ Leave tree individuals and clumps. Using observed reference condition as guidance for ratio of individuals to clumps and the number of trees per clump (2-20+). Follow ICO approach to quantifying and restoring forest spatial pattern.</li> </ul> <p><u>Reduce stand densities and increase mean diameter.</u></p> <ul style="list-style-type: none"> <li>○ Manage tree density for each density class as prescribed by treatment intensity designation using stocking chart as guidance. Overall average density would vary within this range depending on observed reference condition and existing old tree density.</li> <li>○ Thin from below removing trees with poor crowns (&lt;35% live crown ratio).</li> <li>○ Retain young (individuals and clumps) replacement trees at a minimum density of 10 to 30 basal area per acre regardless of density class. Young tree leave trees would consist of vigorous (&gt;35% live crown ratio) dominant and co-dominants with occasional (&gt;45% live crown ratio) mid story and understory trees as individuals or as part of clump.</li> </ul> <p><u>Initiate fire where and when feasible.</u></p> <ul style="list-style-type: none"> <li>○ Burn objectives within thinning units are to increase tree canopy base height, reduce litter/duff cover and produce effects that stimulate regeneration and growth of native herbaceous vegetation.</li> <li>○ Prescribed burns are designed to maintain and enhance desired forest structure, tree densities, snag densities, and CWD levels.</li> </ul> <p><u>Discriminate against dwarf mistletoe infected trees, host species for Douglas-fir mistletoe and create conditions that minimizes potential for spread to uninfected trees.</u></p> <ul style="list-style-type: none"> <li>○ Retention of mistletoe infected trees: <ul style="list-style-type: none"> <li>➤ Old trees regardless of infection level.</li> <li>➤ Young trees with the lowest mistletoe infection rating when needed to meet stocking objective</li> </ul> </li> <li>○ Wherever trees infected with mistletoe are left, establish a non-host or unstocked buffer of at least 50' between infected trees and uninfected residuals.</li> </ul>
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PVG/Tree Density Class	SDI	BA Equivilant	Quadratic Mean Diameter (QMD)								
			8	10	12	14	16	18	20	22	24
Dry Low	<83	Less Than	41	45	49	52	55	57	60	62	64
Dry Moderate	83-128	Between	41-64	45-70	49-75	52-80	55-84	57-88	60-92	62-96	64-99
Dry High	>128	Greater Than	64	70	75	80	84	88	92	96	99
Moist Low	<165	Less Than	82	90	97	103	109	114	119	123	128
Moist Moderate	165-248	Between	82-123	90-135	97-146	103-155	109-163	114-171	119-178	123-185	128-192
Moist High	>248	Greater Than	123	135	146	155	163	171	178	185	192

<b>Silv – 2</b>	<p><b>Other Miscellaneous Design</b></p> <ul style="list-style-type: none"> <li>○ Trees <math>\geq 21</math> inches DBH Alternative 2 – Grand fir, lodgepole pine and Douglas-fir trees greater than 21 inches DBH that do not meet the definition of old, may be removed in areas with a STS_High or GS treatment type when needed to <ul style="list-style-type: none"> <li>➤ daylight seral species (ponderosa pine and western larch)</li> <li>➤ create canopy gaps of appropriate orientation and size to facilitate natural regeneration of ponderosa pine and western larch</li> <li>➤ reduce grand fir, lodgepole pine and Douglas-fir seed sources.</li> </ul> </li> <li>○ Trees <math>\geq 21</math> inches DBH Alternative 3 – No trees greater than 21 inches DBH may be cut.</li> <li>○ Group selection treatments - No regeneration groups will be created within 100 feet of identified category 4 streams.</li> <li>○ Connectivity corridors – for dry forest PVG stands identified as part of a connectivity corridor, maintain an overall stand minimum canopy cover of 40%.</li> <li>○ Connectivity corridors – for moist forest PVG stands identified as part of a connectivity corridor, maintain an overall stand minimum canopy cover of 50%.</li> <li>○ Marten habitat – for stands identified as marten habitat (moist, large tree, closed canopy), maintain an overall stand minimum canopy cover of 60%.</li> </ul>
<b>Silv – 3</b>	<p><b>Other Treatment Specific Design</b></p> <p><b>Group Selection – Low, Moderate and High Intensity Treatments</b></p> <p>ICO variable density thinning within all age classes present; ½ to 4 acre group selection to initiate new cohort of seral species (PP/WL)</p> <ul style="list-style-type: none"> <li>○ Uneven age thinning and group selection would be used to establish openings between individual trees and tree clumps, thin tree clumps, and create regeneration openings.</li> <li>○ Establish ½ to 4 acre regeneration groups within up to 20% of each GS</li> </ul>

	<p>unit. Group size and shape is dependent on extent of grand fir/Douglas-fir cohort that is being replaced, extent of available ponderosa pine/western larch seed trees, and sunlight requirement of species that is being regenerated.</p> <p><b><i>Single Tree Selection - Low, Moderate and High Intensity Treatments</i></b></p> <p>ICO variable density thinning within all age classes present.</p> <ul style="list-style-type: none"> <li>○ Uneven age thinning would be used to establish openings between individual trees and tree clumps, and thin tree clumps.</li> </ul> <p><b><i>Single Tree Selection Old Growth – Low and Moderate Intensity Treatments</i></b></p> <p>ICO variable density thinning within all age classes present.</p> <ul style="list-style-type: none"> <li>○ Retain all existing old growth characteristics as described in the WW Forest Plan MA15 description and the R6 Interim Old Growth Definition.</li> </ul> <p><b><i>Intermediate Treatment - Low, Moderate and High Intensity Treatments</i></b></p> <p>ICO variable density thinning within all age classes present with emphasis on isolating mistletoe infections and creating conditions that reduce intensification of infection.</p> <ul style="list-style-type: none"> <li>○ Favor non-host species as leave trees.</li> <li>○ Tree clumps/individuals would be managed to improve tree vigor and growth by retaining the best growing dominant and co-dominant trees with the least amount of mistletoe within each clump.</li> <li>○ Isolate mistletoe infected clumps or individuals with a host tree buffer of approximately 50 feet beginning at the last visible sign of infection</li> </ul> <p><b><i>Stand Improvement – Seed/Sap and Pole Treatments</i></b></p> <p>ICO variable density thinning within young, post disturbance stands.</p> <ul style="list-style-type: none"> <li>○ Thinning would be used to establish openings between individual trees and tree clumps, and thin tree clumps.</li> </ul> <p><b><i>Savanna Treatment/Meadow Restoration Treatment</i></b></p> <p>Reestablishment of grassland/forest edges and historic grasslands that have conifer encroachment.</p> <ul style="list-style-type: none"> <li>○ Restore pre-settlement tree density and pattern using pre-settlement evidence as guidance.</li> <li>○ Tree group arrangement, size, and density are a function of existing pre-settlement trees and evidence. Retain all old trees and the largest young trees that most closely resemble old trees in size and form as replacement trees</li> </ul>
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## General Planning Activities

- Plan-1 Forest and Grassland Planning
- Plan-2 Project Planning and Analysis
- Plan-3 Aquatic Management Zone Planning

Plan-1 Forest and Grassland Planning	
<b>Manual or Handbook Reference</b>	Forest Service Manual (FSM) 1900, FSM 1920, Forest Service Handbook (FSH) 1909.12, and FSM 2511.
<b>Objective</b>	Use the land management planning and decision making processes to incorporate direction for water quality management consistent with laws, regulation, and policy into land management plans.
<b>Practices</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Establish desired conditions, goals, and objectives for soil, water quality, and riparian resources that contribute to the overall sustainability of social, economic, and ecological systems in the plan area consistent with established State or national water quality goals for the plan area.<ul style="list-style-type: none"><li>○ Consider the water quantity, quality, location, and timing of flows needed to provide water supplies for municipal, agricultural, commercial, and industrial uses; hydropower generation; water recreation, transportation, and spiritual uses; aesthetic appreciation; and tourism to contribute to social and economic sustainability.</li><li>○ Consider the water quantity, quality, location, and timing of flows needed to provide the ecological conditions to support diversity of native and desired nonnative plants and animal species in the plan area to contribute to ecological sustainability.</li></ul></li><li><input type="checkbox"/> Include plan objectives to maintain or, where appropriate, improve or restore watershed conditions to achieve desired conditions of soil, water quality, and riparian resources.</li><li><input type="checkbox"/> Consider watershed characteristics, current and expected environmental conditions (including climate change), and potential effects of land uses when determining suitability of NFS lands within the planning area for various uses.</li><li><input type="checkbox"/> Include standards and guidelines to maintain and, where appropriate, improve over time the quality of soil, water resources, and riparian areas when implementing site-specific projects and activities.</li><li><input type="checkbox"/> Include monitoring questions and associated performance measures to address watershed condition and water quality goals and objectives.</li></ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> No Additional BMPs</li></ul>

	Plan-2 Project Planning and Analysis
<b>Manual or Handbook Reference</b>	Forest Service Manual (FSM) 1950, Forest Service Handbook (FSH) 1909.15, and FSM 2524.
<b>Objective</b>	Use the project planning, environmental analysis, and decision making processes to incorporate water quality management BMPs into project design and implementation.
<b>Practices</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Include watershed specialists (hydrologist, soil scientist, geologist, and fish biologist) and other trained and qualified individuals on the interdisciplinary team for project planning, environmental analysis, and decision making to evaluate onsite watershed characteristics and the potential environmental consequences of the proposed activity(s).</li> <li><input type="checkbox"/> Determine water quality management objectives for the project area. <ul style="list-style-type: none"> <li>○ Identify water quality management desired conditions and objectives from the land management plan.</li> <li>○ Identify and evaluate the condition of water features in the project area (e.g., streams, lakes, ponds, reservoirs, wetlands, riparian areas, springs, groundwater-dependent ecosystems, recharge areas, and floodplains).</li> <li>○ Identify State-designated beneficial uses of waterbodies and the water quality parameters that are critical to those uses.</li> <li>○ Identify locations of dams and diversions for municipal or irrigation water supplies, fish hatcheries, stockwater, fire protection, or other water uses within the project area.</li> <li>○ Identify any impaired (e.g., 303[d] listed) waterbodies in the project area and associated Total Maximum Daily Load (TMDL) analyses or other restoration plans that may exist.</li> <li>○ Identify threatened, endangered, or sensitive species in or near water, wetlands, and riparian areas in the project area and their habitat needs related to water quality.</li> </ul> </li> <li><input type="checkbox"/> Determine potential or likely direct and indirect impacts to chemical, physical, and biological water quality, and watershed condition from the proposed activity. <ul style="list-style-type: none"> <li>○ Always assume hydrological connections exist between groundwater and surface water in each watershed, unless it can reasonably be shown none exist in a local situation.</li> <li>○ Consider the impacts of current and expected environmental conditions such as atmospheric deposition and climate change in the project area when analyzing effects of the proposed activities.</li> <li>○ Evaluate sources of waterbody impairment, including water quantity, streamflows, and water quality, and the likelihood that proposed activities would contribute to current or future impairment or restoration to achieve desired watershed conditions.</li> <li>○ Identify and delineate unstable areas in the project area.</li> <li>○ Identify soil limitations and productivity impacts of proposed activities.</li> <li>○ Verify preliminary findings by inspecting the sites in the field.</li> <li>○ Develop site-specific BMP prescriptions, design criteria, and mitigation measures to achieve water quality management objectives. Consult local, regional, State, or other agencies' required or recommended BMPs that are applicable to the activity.</li> <li>○ Consider enhanced BMPs identified in a TMDL or other watershed restoration plan to protect impaired waterbodies within the project area.</li> <li>○ Use site evaluations, professional experience, monitoring results, and land</li> </ul> </li> </ul>

	<p>management plan standards, guidelines, and other requirements.</p> <ul style="list-style-type: none"> <li>○ Identify Federal, State, and local permits or requirements needed to implement the project.</li> <li>○ Examples include water quality standards, CWA 401 certification, CWA 402 permits (including stormwater permits), CWA 404 permits, and Coastal Zone Management Act requirements.</li> <li>○ Plan to limit surface disturbance to the extent practicable while still achieving project objectives.</li> <li>○ Designate specific AMZs around water features in the project area (see BMP Plan-3 [AMZ Planning]).</li> <li>○ Design activities on or near unstable areas and sensitive soils to minimize management induced impacts.</li> <li>○ Use local direction and requirements for prevention and control of terrestrial and aquatic invasive species.</li> </ul> <p><input type="checkbox"/> Use suitable tools to analyze the potential for cumulative watershed effects (CWE) to occur from the additive impacts of the proposed project and past, present, and reasonably foreseeable future activities on NFS and neighboring lands within the project watersheds.</p> <ul style="list-style-type: none"> <li>○ Consider the natural sensitivity or tolerance of the watershed based on geology, climate, and other relevant factors.</li> <li>○ Consider the existing condition of the watershed and water quality as a reflection of past land management activities and natural disturbances.</li> <li>○ Estimate the potential for adverse effects to soil, water quality, and riparian resources from current and reasonably foreseeable future activities on all lands within the watershed relative to existing watershed conditions.</li> <li>○ Use land management plan direction; Federal, State, or local water quality standards; and other regulations to determine acceptable limits for CWE.</li> <li>○ Modify the proposed project or activity as necessary by changing project design, location, and timing to reduce the potential for CWE to occur.</li> <li>○ Consider including additional mitigation measures to reduce project effects.</li> <li>○ Identify and implement opportunities for restoration activities to speed recovery of watershed condition before initiating additional anthropogenic disturbance in the watershed.</li> <li>○ Coordinate and cooperate with other Federal, State, and private landowners in assessing and preventing CWE in multiple ownership watersheds.</li> </ul> <p><input type="checkbox"/> Integrate restoration and rehabilitation needs into the project plan.</p> <ul style="list-style-type: none"> <li>○ Consider water quality improvement actions identified in a TMDL or other watershed restoration plan to restore impaired waterbodies within the project area.</li> </ul> <p><input type="checkbox"/> Identify project-specific monitoring needs.</p> <p><input type="checkbox"/> Document site-specific BMP prescriptions, design criteria, mitigation measures, and restoration, rehabilitation, and monitoring needs in the applicable National Environmental Policy Act (NEPA) documents, design plans, contracts, permits, authorizations, and operation and maintenance plans.</p> <ul style="list-style-type: none"> <li>○ Delineate all protected or excluded areas, including, for example, AMZs and waterbodies, 303(d) listed and TMDL waterbodies, and municipal supply watersheds, on the project map.</li> </ul>
<b>Local / Site Specific BMP</b>	<p><input type="checkbox"/> No Additional BMPs</p>

Plan-3 Aquatic Management Zone Planning	
<b>Manual or Handbook Reference</b>	Forest Service Manual (FSM) 2526
<b>Objective</b>	To maintain and improve or restore the condition of land around and adjacent to waterbodies in the context of the environment in which they are located, recognizing their unique values and importance to water quality while implementing land and resource management activities.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Proactively manage the AMZ to maintain or improve long-term health and sustainability of the riparian ecosystem and adjacent waterbody consistent with desired conditions, goals, and objectives in the land management plan. <ul style="list-style-type: none"> <li>○ Balance short-term impacts and benefits with long-term goals and desired future conditions, considering ecological structure, function, and processes, when evaluating proposed management activities in the AMZ.</li> <li>○ Determine the width of the AMZ for waterbodies in the project area that may be affected by the proposed activities:</li> <li>○ Evaluate the condition of aquatic and riparian habitat and beneficial riparian zone functions and their estimated response to the proposed activity in determining the need for and width of the AMZ.</li> <li>○ Use stream class and type, channel condition, aspect, side slope steepness, precipitation and climate characteristics, soil erodibility, slope stability, groundwater features, and aquatic and riparian conditions and functions to determine appropriate AMZ widths to achieve desired conditions in the AMZ.</li> <li>○ Include riparian vegetation within the designated AMZ and extend the AMZ to include steep slopes, highly erodible soils, or other sensitive or unstable areas.</li> <li>○ Establish wider AMZ areas for waters with high resource value and quality.</li> <li>○ Design and implement project activities within the AMZ to:</li> <li>○ Avoid or minimize unacceptable impacts to riparian vegetation, groundwater recharge areas, steep slopes, highly erodible soils, or unstable areas.</li> <li>○ Maintain or provide sufficient ground cover to encourage infiltration, avoid or minimize erosion, and to filter pollutants.</li> <li>○ Avoid, minimize, or restore detrimental soil compaction.</li> <li>○ Retain trees necessary for shading, bank stabilization, and as a future source of large woody debris.</li> <li>○ Retain floodplain function.</li> <li>○ Restore existing disturbed areas that are eroding and contributing sediment to the waterbody.</li> </ul> </li> <li><input type="checkbox"/> Mark the boundaries of the AMZ and sensitive areas like riparian areas, wetlands, and unstable areas on the ground before land disturbing activities.</li> </ul>

<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Utilize PACFISH RHCA buffers to protect all stream course, wetlands and waterways in the project area</li><li><input type="checkbox"/> Protect all no-harvest stream and wetland buffers with directional felling, and waive debris cleanout of streams.</li><li><input type="checkbox"/> Trees that are in no-harvest buffers and are damaged during timber harvest or road activities will be left on site.</li><li><input type="checkbox"/> Restrict ground-based equipment entry to beyond 75 feet of streams and wet areas, or outside the no-harvest buffer, whichever is greater.</li><li><input type="checkbox"/> The following are the recommended minimum no-harvest buffer width recommendations to ensure protection of unmapped streams and wet areas identified during project implementation. The district hydrologist or fish biologist will be consulted to assign appropriate stream buffers and these individuals may modify the recommended buffers but must assure compliance with PACFISH and the Lower Grande Ronde (2010) Temperature TMDL Implementation Strategy by providing the following minimum buffers:<ul style="list-style-type: none"><li>○ Class 1, 2, 3 = 100 feet (except for 58 Acres along Swamp Creek in Alt 2)</li><li>○ Class 4 = 25 feet (variable) - Alt 2, 100 feet in Alt 3</li></ul></li></ul>
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## Aquatic Ecosystems Management Activities

- **AqEco-2. Operations in Aquatic Ecosystems**
- **AqEco-3. Ponds and Wetlands**
- **AqEco-4. Stream Channels and Shorelines**

AqEco-2. Operations in Aquatic Ecosystems	
<b>Manual or Handbook Reference</b>	None known.
<b>Objective</b>	Avoid, minimize, or mitigate adverse impacts to water quality when working in aquatic ecosystems.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (AMZ Planning) when planning operations in aquatic ecosystems.</li><li><input type="checkbox"/> Identify the aquatic and aquatic-dependent species that live in the waterbody, Aquatic Management Zone (AMZ), or on the floodplain and their life histories to determine protection strategies, such as timing of construction, sediment management, species relocation, and monitoring during construction.</li><li><input type="checkbox"/> Coordinate stream channel, shoreline, lake, pond, and wetland activities with appropriate State and Federal agencies.<ul style="list-style-type: none"><li>○ Incorporate Clean Water Act (CWA) 404 permit requirements and other Federal, State, and local permits or requirements into the project design and plan.</li></ul></li></ul>

	<ul style="list-style-type: none"> <li>□ Use suitable measures to protect the waterbody when preparing the site for construction or maintenance activities. <ul style="list-style-type: none"> <li>○ Clearly delineate the work zone.</li> <li>○ Locate access and staging areas near the project site but outside of work area boundaries, AMZs, wetlands, and sensitive soil areas.</li> <li>○ Refuel and service equipment only in designated staging areas (see BMP Road-10 [Equipment Refueling and Servicing]).</li> <li>○ Develop an erosion and sediment control plan to avoid or minimize downstream impacts using measures appropriate to the site and the proposed activity (see BMP Fac-2 [Facility Construction and Stormwater Control]).</li> <li>○ Prepare for unexpected failures of erosion control measures.</li> <li>○ Consider needs for solid waste disposal and worksite sanitation.</li> <li>○ Consider using small, low ground pressure equipment, and hand labor where practicable.</li> <li>○ Ensure all equipment operated in or adjacent to the waterbody is clean of aquatic invasive species, as well as oil and grease, and is well maintained.</li> <li>○ Use vegetable oil or other biodegradable hydraulic oil for heavy equipment hydraulics wherever practicable when operating in or near water.</li> </ul> </li> <li>□ Schedule construction or maintenance operations in waterbodies to occur in the least critical periods to avoid or minimize adverse effects to sensitive aquatic and aquatic-dependent species that live in or near the waterbody. <ul style="list-style-type: none"> <li>○ Avoid scheduling instream work during the spawning or migration seasons of resident or migratory fish and other important life history phases of sensitive species that could be affected by the project.</li> <li>○ Avoid scheduling instream work during periods that could be interrupted by high flows.</li> <li>○ Consider the growing season and dormant season for vegetation when scheduling activities within or near the waterbody to minimize the period of time that the land would remain exposed, thereby reducing erosion risks and length of time when aesthetics are poor.</li> </ul> </li> <li>□ Use suitable measures to protect the waterbody when clearing the site. <ul style="list-style-type: none"> <li>○ Clearly delineate the geographic limits of the area to be cleared.</li> <li>○ Use suitable drainage measures to improve the workability of wet sites.</li> <li>○ Avoid or minimize unacceptable damage to existing vegetation, especially plants that are stabilizing the bank of the waterbody.</li> </ul> </li> <li>□ Use suitable measures to avoid or minimize impacts to the waterbody when implementing construction and maintenance activities. <ul style="list-style-type: none"> <li>○ Minimize heavy equipment entry into or crossing water as is practicable.</li> <li>○ Conduct operations during dry periods.</li> <li>○ Stage construction operations as needed to limit the extent of disturbed areas without installed stabilization measures.</li> <li>○ Promptly install and appropriately maintain erosion control measures.</li> <li>○ Promptly install and appropriately maintain spill prevention and containment measures.</li> </ul> </li> </ul>
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	<ul style="list-style-type: none"><li>○ Promptly rehabilitate or stabilize disturbed areas as needed following construction or maintenance activities.</li><li>○ Stockpile and protect topsoil for reuse in site revegetation.</li><li>○ Minimize bank and riparian area excavation during construction to the extent practicable.</li><li>○ Keep excavated materials out of the waterbody.</li><li>○ Use only clean, suitable materials that are free of toxins and invasive species for fill.</li><li>○ Properly compact fills to avoid or minimize erosion.</li><li>○ Balance cuts and fills to minimize disposal needs.</li><li>○ Remove all project debris from the waterbody in a manner that will cause the least disturbance.</li><li>○ Identify suitable areas offsite or away from waterbodies for disposal sites before beginning operations.</li><li>○ Contour site to disperse runoff, minimize erosion, stabilize slopes, and provide a favorable environment for plant growth.</li><li>○ Use suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li></ul> <p><input type="checkbox"/> Use suitable measures to divert or partition channelized flow around the site or to dewater the site as needed to the extent practicable.</p> <ul style="list-style-type: none"><li>○ Remove aquatic organisms from the construction area before dewatering and prevent organisms from returning to the site during construction.</li><li>○ Return clean flows to channel or waterbody downstream of the activity.</li><li>○ Restore flows to their natural stream course as soon as practicable after construction or before seasonal closures.</li></ul> <p><input type="checkbox"/> Inspect the work site at suitable regular intervals during and after construction or maintenance activities to check on quality of the work and materials and identify need for midproject corrections.</p> <p><input type="checkbox"/> Consider short- and long-term maintenance needs and unit capabilities when designing the project.</p> <ul style="list-style-type: none"><li>○ Develop a strategy for providing emergency maintenance when needed.</li></ul> <p><input type="checkbox"/> Include implementation and effectiveness monitoring to evaluate success of the project in meeting design objectives and avoiding or minimizing unacceptable impacts to water quality.</p> <p><input type="checkbox"/> Consider long-term management of the site and nearby areas to promote project success.</p> <ul style="list-style-type: none"><li>○ Use suitable measures to limit human, vehicle, and livestock access to site as needed to allow for recovery of vegetation.</li></ul>
<b>Local / Site Specific BMP</b>	<p><input type="checkbox"/> The following are the recommended minimum no-harvest buffer width recommendations to ensure protection of unmapped streams and wet areas identified during project implementation. The district hydrologist or fish biologist will be consulted to assign appropriate stream buffers and these individuals may modify the recommended buffers but must assure compliance with PACFISH and the Lower Grande Ronde (2010)</p>

	<p>Temperature TMDL Implementation Strategy by providing the following minimum buffers:</p> <ul style="list-style-type: none"> <li>○ Class 1, 2, 3 = 100 feet (except for 58 Acres along Swamp Creek in Alt 2)</li> <li>○ Class 4 = 25 feet (variable) - Alt 2, 100 feet in Alt 3</li> </ul>
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AqEco-3. Ponds and Wetlands	
<b>Manual or Handbook Reference</b>	None known.
<b>Objective</b>	Design and implement pond and wetlands projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes, or mitigates adverse effects to soil, water quality, and riparian resources.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems) when working in or near waterbodies.</li> <li><input type="checkbox"/> Obtain and manage water rights.</li> <li><input type="checkbox"/> Clearly define goals and objectives in the project plan appropriate to the site for desired hydrology, wetland plant community associations, intended purpose, and function of the pond or wetland and expected values.</li> <li><input type="checkbox"/> Select sites based on an analysis of landscape structure and associated ecological functions and values. <ul style="list-style-type: none"> <li>○ Construct ponds and wetlands on sites that have easy construction access where practicable.</li> <li>○ Construct wetlands in landscape positions and soil types capable of supporting desired wetland functions and values.</li> <li>○ Construct ponds outside of active floodplain to minimize overflow of groundwater-fed ponds into adjacent streams and avoid or minimize erosion of pond embankments by floods, unless location in the floodplain is integral to achieving project objectives.</li> <li>○ Construct ponds with surface water supply off-channel rather than placing a dam across a stream.</li> <li>○ Construct ponds and wetlands on sites with soils suitable to hold water with minimal seepage loss and that provide a stable foundation for any needed embankments.</li> <li>○ Construct ponds and wetlands in locations where polluted surface water runoff or groundwater discharge do not reach the pond.</li> <li>○ Consider the consequences of dam or embankment failure and resulting damage from sudden release of water on potentially affected areas.</li> </ul> </li> <li><input type="checkbox"/> Ensure that the natural water supply for the pond or wetland is sufficient to meet the needs of the intended use and that it will maintain the desired water levels and water quality. <ul style="list-style-type: none"> <li>○ Design the wetland to create hydrologic conditions (including the timing of inflow and outflow, duration, and frequency of water level</li> </ul> </li> </ul>

	<p>fluctuations) that provide the desired wetland functions and values.</p> <ul style="list-style-type: none"><li>○ Avoid or minimize drawdown effects in a stream source by limiting timing and rate of water withdrawal to allow sufficient downstream water flow to maintain desired conditions in the source stream (see BMP WatUses-1 [Water Uses Planning]).</li></ul> <p>□ Design the wetland project to create a biologically and hydrologically functional system.</p> <ul style="list-style-type: none"><li>○ Design for function, not form.</li><li>○ Keep the design simple and avoid over engineering.</li><li>○ Design the project for minimal maintenance needs.</li><li>○ Use natural energies, such as gravity flow, in the design.</li><li>○ Avoid use of hard engineering structures or the use of supplemental watering to support system hydrology.</li><li>○ Plan to allow wetland system time to develop after construction activities are complete.</li></ul> <p>□ Design the pond or wetland to be of sufficient size and depth appropriate for the intended use and to optimize hydrologic regimes and wetland plant community development.</p> <ul style="list-style-type: none"><li>○ Size the pond or wetland appropriately for the contributing drainage area such that a desired water level can be maintained during drought conditions and that excess runoff during large storms can be reasonably accommodated without constructing large overflow structures.</li><li>○ Size the pond or wetland to an adequate depth to store sufficient amounts of water for the intended use and offset probable evaporation and seepage losses.</li><li>○ Integrate design with the natural topography of the site to minimize site disturbance.</li><li>○ Design the pond or wetland to have an irregular shape to reduce wind and wave impacts, disperse water flows, maximize retention times, and better mimic natural systems.</li><li>○ Create microtopography and macrotopography in wetlands to mimic natural conditions and achieve hydrologic and vegetative diversity.</li><li>○ Avoid creating large areas of shallow water to minimize excessive evaporation losses and growth of noxious aquatic plants.</li><li>○ Avoid steep-sloped shorelines in areas with potential substrate instability problems to reduce erosion and sedimentation.</li></ul> <p>□ Include water control structures to manage water levels as necessary.</p> <ul style="list-style-type: none"><li>○ Design spillway or outlet to maintain desired water level under normal inflows from snowmelt, groundwater flow, and precipitation.</li><li>○ Design discharge capacity using a suitable hydrologic analysis of the drainage area to be sufficient to safely pass the flow resulting from the design storm event.</li><li>○ Size the spillway to release floodwaters in a volume and velocity that do not erode the spillway, the area beyond the outlet, or the downstream channel.</li><li>○ Consider the need for suitable measures to drain the pond or wetland.</li><li>○ Return overflow back to the original source to the extent practicable.</li><li>○ Use suitable measures to maintain desired downstream temperatures, dissolved oxygen levels, and aquatic habitats when water is released from the pond or impoundment.</li></ul>
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	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use materials appropriate for the purpose of the pond and site. <ul style="list-style-type: none"> <li>○ Select materials for a dam or embankment that will provide sufficient strength and, when properly compacted, will be tight enough to avoid or minimize excessive or harmful percolation of water through the dam or embankment.</li> <li>○ Design the side slopes appropriately for the material being used to ensure stability of the dam or embankment.</li> </ul> </li> <li><input type="checkbox"/> Use wetland vegetation species and establishment methods suitable to the project site and objectives, consistent with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species. <ul style="list-style-type: none"> <li>○ Consider the timing of planting to achieve maximum survival, proposed benefit of each plant species, methods of planting, proposed use of mulch, potential soil amendment (organic material or fertilizer), and potential supplemental watering to help establish the plant community.</li> </ul> </li> <li><input type="checkbox"/> Properly maintain dams, embankments, and spillways to avoid or minimize soil erosion and leakage problems. <ul style="list-style-type: none"> <li>○ Use suitable measures to avoid or minimize erosion of dams and shores due to wind and wave action.</li> <li>○ Design sufficient freeboard to avoid or minimize overtopping by wave action or other causes.</li> <li>○ Stabilize or armor spillways for ponds with continuous flow releases or overflow during heavy rainfall events.</li> </ul> </li> <li><input type="checkbox"/> Manage uplands and surrounding areas to avoid or minimize unacceptable impacts to water quality in the pond or wetland.</li> </ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Road work at perennial streams, to be done under the timber sale contract, will be constructed during the inwater workwindow as prescribed by Oregon Department of Fish &amp; Wildlife and approved by NOAA Fisheries</li> </ul>

AqEco-4. Stream Channels and Shorelines	
<b>Manual or Handbook Reference</b>	None known.
<b>Objective</b>	Design and implement stream channel and lake shoreline projects in a manner that increases the potential for success in meeting project objectives and avoids, minimizes, or mitigates adverse effects to soil, water quality, and riparian resources.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <p><i>All Activities</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems) when working in or near waterbodies.</li> </ul> <p><i>Stream Channels</i></p>

	<ul style="list-style-type: none"><li><input type="checkbox"/> Determine stream type and classification using suitable accepted protocols.</li><li><input type="checkbox"/> Determine need to control channel grade to avoid or minimize erosion of channel bed and banks before selecting measures for bank stabilization or protection.<ul style="list-style-type: none"><li>○ Incorporate grade control measures into project design as needed.</li></ul></li><li><input type="checkbox"/> Determine design flows based on the value or safety of area to be protected, repair cost, and the sensitivity and value of the ecological system involved.<ul style="list-style-type: none"><li>○ Obtain peak flow, low flow, channel forming flow, and flow duration estimates.</li><li>○ Use these estimates to determine the best time to implement the project, as well as to select design flows.</li></ul></li><li><input type="checkbox"/> Determine design velocities appropriate to the site.<ul style="list-style-type: none"><li>○ Limit maximum velocity to the velocity that is nonscouring on the least resistant streambed and bank material.</li><li>○ Consider needs to transport bedload through the reach when determining minimum velocities.</li><li>○ Maintain the depth-area-velocity relationship of the upstream channel through the project reach.</li><li>○ Consider the effects of design velocities on desired aquatic organism habitat and passage.</li></ul></li><li><input type="checkbox"/> Avoid changing channel alignment unless the change is to reconstruct the channel to a stable meander geometry consistent with stream type.</li><li><input type="checkbox"/> Design instream and streambank stabilization and protection measures suitable to channel alignment (straight reach versus curves).<ul style="list-style-type: none"><li>○ Consider the effects of ice and freeze and thaw cycles on streambank erosion processes.</li><li>○ Consider the effects that structures may have on downstream structures and stream morphology, including streambanks, in the maintenance of a natural streambed.</li></ul></li><li><input type="checkbox"/> Design channels with natural stream pattern and geometry and with stable beds and banks; provide habitat complexity where reconstruction of stream channels is necessary.<ul style="list-style-type: none"><li>○ Consider sediment load (bedload and suspended load) and bed material size to determine desired sediment transport rate when designing channels.</li><li>○ Avoid relocating natural stream channels.</li><li>○ Return flow to natural channels, where practicable.</li></ul></li><li><input type="checkbox"/> Include suitable measures to protect against erosion around the edges of stabilization structures.<ul style="list-style-type: none"><li>○ Design revetments and similar structures to include sufficient freeboard to avoid or minimize overtopping at curves or other points where high-flow velocity can cause waves.</li><li>○ Use suitable measures to avoid or minimize water forces undermining the toe of the structure.</li><li>○ Tie structures into stable anchorage points, such as bridge abutments, rock outcrops, or well-vegetated stable sections, to avoid or minimize erosion around the ends.</li></ul></li><li><input type="checkbox"/> Add or remove rocks, wood, or other material in streams only if such action maintains or improves stream condition, provides for safety and stability at bridges and culverts, is needed to avoid or minimize excessive erosion of streambanks, or reduces flooding hazard.</li></ul>
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	<ul style="list-style-type: none"> <li>○ Leave rocks and portions of wood that are embedded in beds or banks to avoid or minimize channel scour and maintain natural habitat complexity.</li> <li>□ Choose vegetation appropriate to the site to provide streambank stabilization and protection adequate to achieve project objectives. <ul style="list-style-type: none"> <li>○ Use vegetation species and establishment methods suitable to the project site and objectives, consistent with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li> </ul> </li> </ul> <p><b>Shorelines</b></p> <ul style="list-style-type: none"> <li>□ Use mean high- and low-water levels to determine the design water surface. <ul style="list-style-type: none"> <li>○ Consider the effects of fluctuating water levels, freeze or thaw cycles, and floating ice on erosion processes at the site.</li> </ul> </li> <li>□ Design stabilization and protection measures suitable to the site. <ul style="list-style-type: none"> <li>○ Determine the shoreline slope configuration above and below the waterline.</li> <li>○ Consider the effects of offshore depth, dynamic wave height, and wave action on shoreline erosion processes.</li> <li>○ Determine the nature of the bank soil material to aid in estimating erosion rates.</li> <li>○ Consider foundation material at the site when selecting structural measures.</li> <li>○ Use vegetation species and establishment methods suitable to the project site and objectives and consistent with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li> </ul> </li> <li>□ Consider the rate, direction, supply, and seasonal changes in littoral transport when choosing the location and design of structural measures.</li> <li>□ Consider the effect structures may have on adjacent shoreline or other nearby structures. <ul style="list-style-type: none"> <li>○ Adequately anchor end sections to existing stabilization measures or terminate in stable areas.</li> </ul> </li> </ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"> <li>□ The following are the recommended minimum no-harvest buffer width recommendations to ensure protection of unmapped streams and wet areas identified during project implementation. The district hydrologist or fish biologist will be consulted to assign appropriate stream buffers and these individuals may modify the recommended buffers but must assure compliance with PACFISH and the Lower Grande Ronde (2010) Temperature TMDL Implementation Strategy by providing the following minimum buffers: <ul style="list-style-type: none"> <li>○ Class 1, 2, 3 = 100 feet (except for 58 Acres along Swamp Creek in Alt 2)</li> <li>○ Class 4 = 25 feet (variable) - Alt 2, 100 feet in Alt 3</li> </ul> </li> </ul>

## Chemical Use Management Activities

### Pertaining to the use of Magnesium Chloride and Water for Dust Abatement

- **Chem-1. Chemical Use Planning**
- **Chem-3. Chemical Use Near Waterbodies**
- **Chem-6. Chemical Application Monitoring and Evaluation**

Chem-1. Chemical Use Planning	
<b>Manual or Handbook Reference</b>	Forest Service Manual (FSM) 2153; Forest Service Handbook (FSH) 2109.14, chapter 10.
<b>Objective</b>	Use the planning process to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from chemical use on NFS lands.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone [AMZ] Planning) when planning activities that involve use of chemicals.</li><li><input type="checkbox"/> Identify municipal supply watersheds; private domestic water supplies; fish hatcheries; and threatened, endangered, and sensitive aquatic dependent species and fish populations near or downstream of chemical treatment areas.</li><li><input type="checkbox"/> Use Integrated Pest Management as the basis for all pesticide-use prescriptions in consultation with the unit Pesticide Use Coordinator.</li><li><input type="checkbox"/> Select chemical products suitable for use on the target species or that meet project objectives. (The Lower Joseph Restoration Project is not analyzing the use of chemical herbicides.)<ul style="list-style-type: none"><li>○ Use chemicals that are registered for the intended uses.</li></ul></li><li><input type="checkbox"/> Consult the Materials Safety Data Sheet and product label for information on use, hazards, and safe handling procedures for chemicals products under consideration for use.</li><li><input type="checkbox"/> Consider chemical solubility, absorption, breakdown rate properties, and site factors when determining which chemical products to use.<ul style="list-style-type: none"><li>○ Use chemicals with properties such that soil residual activity will persist only as long as needed to achieve treatment objectives.</li><li>○ Consider soil type, chemical mobility, distance to surface water, and depth to groundwater to avoid or minimize surface water and groundwater contamination.</li></ul></li><li><input type="checkbox"/> Use a suitable pressure, nozzle size, and nozzle type combination to minimize off-target drift or droplet splatter. (The Lower Joseph Restoration Project is not analyzing the use of chemical herbicides.)</li><li><input type="checkbox"/> Use selective treatment methods for target organisms to the extent practicable. (The Lower Joseph Restoration Project is not analyzing the use of chemical herbicides.)</li><li><input type="checkbox"/> Specify management direction and appropriate site-specific response measures in project plans and safety plans (FSH 2109.14, chapter 60).</li><li><input type="checkbox"/> Ensure that planned chemical use projects conform to all applicable local, State, Federal, and agency laws, regulations, and policies.<ul style="list-style-type: none"><li>○ Obtain necessary permits, including Clean Water Act (CWA) 402 permit coverage.</li></ul></li></ul>

	<ul style="list-style-type: none"> <li>○ Develop spill contingency plans.</li> <li>○ Obtain or provide training and licensing as required by the label and State regulations.</li> </ul>
<b>Local / Site Specific BMP</b>	<input type="checkbox"/> No Additional BMPs

Chem-3. Chemical Use Near Waterbodies	
<b>Manual or Handbook Reference</b>	Forest Service Handbook (FSH) 2109.14 Chapters 10, 50.
<b>Objective</b>	Avoid or minimize the risk of chemical delivery to surface water or groundwater when treating areas near waterbodies.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Identify during project planning those perennial and intermittent surface waters, wetlands, springs, riparian areas, and groundwater recharge areas that may be impacted by the chemical use. <ul style="list-style-type: none"> <li>○ Use field observations to verify the extent of these areas identified from aerial observations, maps, or geographic information system data, as needed.</li> </ul> </li> <li><input type="checkbox"/> Determine the width of a buffer zone, if needed, based on a review of the project area, characteristics of the chemical to be used, and application method. <ul style="list-style-type: none"> <li>○ Consider the designated uses of water, adjacent land uses, expected rainfall, wind speed and direction, terrain, slope, soils, and geology.</li> <li>○ Consider the persistence, mobility, toxicity profile, and bioaccumulation potential of any chemical formulation proposed for use.</li> <li>○ Consider the type of equipment, spray pattern, droplet size, application height, and experience in similar projects.</li> </ul> </li> <li><input type="checkbox"/> Prescribe chemicals and application methods in the buffer zone suitable to achieve project objectives while minimizing risk to water quality.</li> <li><input type="checkbox"/> Flag or otherwise mark or identify buffer zones as needed. <ul style="list-style-type: none"> <li>○ Clearly communicate to those applying the chemical what areas are to be avoided or where alternative treatments are to be used.</li> </ul> </li> <li><input type="checkbox"/> Locate operation bases on upland areas, outside of wetlands or areas with channel or ditch connection to surface water and AMZs.</li> <li><input type="checkbox"/> Use clean equipment and personnel to collect water needed for mixing.</li> <li><input type="checkbox"/> Calibrate application equipment to apply chemicals uniformly and in the correct quantities.</li> <li><input type="checkbox"/> Evaluate weather conditions before beginning spray operations and monitor throughout each day to avoid or minimize chemical drift.</li> </ul>

	<ul style="list-style-type: none"> <li>○ Apply chemicals only under favorable weather conditions as identified in the label instructions.</li> <li>○ Avoid applying chemicals before forecasted severe storm events to limit runoff and ensure the chemical reaches intended targets.</li> <li>○ Suspend operations if project prescription or weather limitations have been exceeded.</li> <li>□ Apply fertilizers during high nutrient-uptake periods to avoid or minimize leaching and translocation. <ul style="list-style-type: none"> <li>○ Base fertilizer type and application rate on soils and foliar analysis.</li> <li>○ Use slow release fertilizers that deliver fertilizer to plants during extended periods in areas with long growing seasons when appropriate to meet project objectives. (The Lower Joseph Restoration Project is not analyzing the use of fertilizers.)</li> </ul> </li> <li>□ Monitor during chemical applications to determine if chemicals are reaching surface waters (see BMP Chem-6 [Chemical Application Monitoring and Evaluation]).</li> <li>□ Implement the chemical spill contingency plan elements within the project safety plan if a spill occurs (FSH 2109.14, chapter 60).</li> </ul>
<b>Local / Site Specific BMP</b>	<input type="checkbox"/> No Additional BMPs

Chem-6. Chemical Application Monitoring and Evaluation	
<b>Manual or Handbook Reference</b>	Forest Service Manual (FSM) 2150.1; Forest Service Handbook (FSH) 2109.14, chapter 50.
<b>Objective</b>	<ol style="list-style-type: none"> <li>1. Determine whether chemicals have been applied safely, have been restricted to intended targets, and have not resulted in unexpected nontarget effects.</li> <li>2. Document and provide early warning of possible hazardous conditions resulting from potential contamination of water or other nontarget resources or areas by chemicals.</li> </ol>
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li>□ Identify the following elements in all water resource monitoring plans and specify the rationale for each: <ul style="list-style-type: none"> <li>○ What are the monitoring questions?</li> <li>○ Who will be involved and what are their roles and responsibilities?</li> <li>○ What parameters will be monitored and analyzed?</li> <li>○ When and where will monitoring take place?</li> <li>○ What methods will be used for sampling and analyses?</li> <li>○ How will Chain of Custody requirements for sample handling be met?</li> <li>○ What are the criteria for quality assurance and quality control?</li> </ul> </li> <li>□ Consider the following factors when developing monitoring questions:</li> </ul>

	<ul style="list-style-type: none"> <li>○ The physical or biological resource of concern, including human health.</li> <li>○ Applicable Federal, State, and local laws and regulations.</li> <li>○ Type of chemical.</li> <li>○ Type of application equipment used and method of application.</li> <li>○ Site-related difficulties that affect both application and monitoring.</li> <li>○ Public concerns.</li> <li>○ Potential benefits of the application.</li> <li>○ Availability of analytic methods, detection limits, tools, and laboratories.</li> <li>○ Costs of monitoring and resources available to implement monitoring plan.</li> </ul> <ul style="list-style-type: none"> <li><input type="checkbox"/> Choose monitoring methods and sample locations suitable to address the monitoring questions. <ul style="list-style-type: none"> <li>○ Consider the need to take random batch or tank samples for future testing in the event of treatment failure or an unexpected adverse effect.</li> </ul> </li> <li><input type="checkbox"/> Monitor sensitive environments during and after chemical applications to detect and evaluate unanticipated events.</li> <li><input type="checkbox"/> Use U.S. Environmental Protection Agency-certified laboratories for chemical sample analysis. <ul style="list-style-type: none"> <li>○ Use appropriate containers, preservation, and transportation to meet Standard Methods requirements.</li> <li>○ Implement proper Chain of Custody procedures for sample handling.</li> </ul> </li> <li><input type="checkbox"/> Evaluate and interpret the results of monitoring in terms of compliance with, and adequacy of, treatment objectives and specifications.</li> </ul>
<b>Local / Site Specific BMP</b>	<input type="checkbox"/>

## Road Management Activities

- **Road-1. Travel Management Planning and Analysis**
- **Road-2. Road Location and Design**
- **Road-3. Road Construction and Reconstruction**
- **Road-4. Road Operations and Maintenance**
- **Road-5. Temporary Roads**
- **Road-6. Road Storage and Decommissioning**
- **Road-7. Stream Crossings**
- **Road-8. Snow Removal and Storage**
- **Road-9. Parking and Staging Areas**
- **Road-10. Equipment Refueling and Servicing**
- **Road-11. Road Storm-Damage Surveys**

Road-1. Travel Management Planning and Analysis	
<b>Manual or Handbook Reference</b>	Forest Service Manual (FSM) 7710; Forest Service Handbook (FSH) 7709.55; and FSH 7709.59, chapter 10.
<b>Objective</b>	Use the travel management planning and analysis processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during road management activities.
<b>Practices</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone [AMZ] Planning) when conducting travel management planning and analysis.</li> <li><input type="checkbox"/> Use interdisciplinary coordination for travel planning and project-level transportation analysis, including engineers, hydrologists, soil scientists, and other resource specialists as needed, to balance protection of soil, water quality, and riparian resources with transportation and access needs.</li> <li><input type="checkbox"/> Design the transportation system to meet long-term land management plan desired conditions, goals, and objectives for access rather than to access individual sites.</li> <li><input type="checkbox"/> Limit roads to the minimum practicable number, width, and total length consistent with the purpose of specific operations, local topography, geology, and climate to achieve land management plan desired conditions, goals, and objectives for access and water quality management. <ul style="list-style-type: none"> <li>○ Use existing roads when practicable.</li> <li>○ Use system roads where access is needed for long-term management of an area or where control is needed in the location, design, or construction of the road to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.</li> <li>○ Use temporary roads for short-term access needs if the road can be constructed, operated, and obliterated without specific control of techniques to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources (See BMP Road-5 [Temporary Roads]).</li> <li>○ Decommission temporary roads and return to resource production when the access is no longer needed (See BMP Road-6 [Road Storage and Decommissioning]).</li> <li>○ Consider placing roads in storage (Maintenance Level 1) when the time between intermittent uses exceeds 1 year and the costs of annual maintenance (both economic and potential disturbance) or potential failures due to lack of maintenance exceed the benefits of keeping the road open in the interim (See BMP Road-6 [Road Storage and Decommissioning]).</li> <li>○ Consider decommissioning unneeded existing roads within a planning area when planning new system roads to reduce cumulative impacts to soil, water quality, and riparian resources (See BMP Road-6 [Road Storage and Decommissioning]).</li> </ul> </li> <li><input type="checkbox"/> Plan road networks to have the minimum number of waterbody crossings as is practicable and necessary to achieve transportation system desired conditions, goals, and objectives.</li> </ul>

	<ul style="list-style-type: none"> <li><input type="checkbox"/> Develop or update RMOs for each system road to include design criteria, operation criteria, and maintenance criteria to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. <ul style="list-style-type: none"> <li>○ Use applicable practices of BMP Road-2 (Road Location and Design) to establish design elements and standards.</li> <li>○ Use applicable practices of BMP Road-4 (Road Operations and Maintenance) to establish criteria on how the road is to be operated and maintained.</li> <li>○ Revise RMOs as needed to meet changing conditions.</li> </ul> </li> <li><input type="checkbox"/> Identify and evaluate road segments causing, or with the potential to cause, adverse effects to soil, water quality, and riparian resources. <ul style="list-style-type: none"> <li>○ Identify and prioritize suitable mitigation measures to avoid, minimize, or mitigate adverse effects (see BMPs Road-2 (Road Location and Design), Road-3 (Road Construction and Reconstruction), Road-4 (Road Operations and Maintenance), Road-6 (Road Storage and Decommissioning), and Road-7 (Stream Crossings) for potential mitigation measures).</li> </ul> </li> </ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> All new temporary road construction will be done using outslope designs, with drain dips and grade sags as needed, so that no new ditchlines will be built.</li> <li><input type="checkbox"/> Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems.</li> <li><input type="checkbox"/> Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked.</li> <li><input type="checkbox"/> The timber sale purchasers are required to obliterate temporary spur roads under the timber sale contract. This involves subsoiling the road as appropriate, seeding as needed, and pulling displaced soil and duff back over the road surface. Slash will be pulled over the top of the road to provide additional ground cover and bare soil protection. Obliteration of temporary roads (new or legacy) shall meet specifications of the Forest Service, for depth of treatment and use of effective ground cover on treatment area.</li> <li><input type="checkbox"/> All opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 tons weed free straw per acre.. All temporary roads would remain closed to winter access by the public, unless otherwise agreed to by the Forest Service.</li> </ul>

Road-2. Road Location and Design	
<b>Manual or Handbook Reference</b>	FSM 7720 and FSH 7709.56.

<b>Objective</b>	Locate and design roads to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.
<b>Practices</b>	<p><b>Location</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Locate roads to fit the terrain, follow natural contours, and limit the need for excavation.<ul style="list-style-type: none"><li>○ Avoid locations that require extended steep grades, sharp curves, or switchbacks.</li></ul></li><li><input type="checkbox"/> Locate roads on stable geology with well-drained soils and rock formations that dip into the slope.<ul style="list-style-type: none"><li>○ Avoid hydric soils, inner gorges, overly steep slopes, and unstable landforms to the extent practicable.</li></ul></li><li><input type="checkbox"/> Locate roads as far from waterbodies as is practicable to achieve access objectives, with a minimum number of crossings and connections between the road and the waterbody.<ul style="list-style-type: none"><li>○ Avoid sensitive areas such as riparian areas, wetlands, meadows, bogs, and fens, to the extent practicable.</li><li>○ Provide an AMZ of suitable width between the road and a waterbody to maintain desired conditions, goals, and objectives for structure, function, and processes of the AMZ and associated waterbody when a road must parallel a waterbody (See BMP Plan-3 [AMZ Planning]).</li></ul></li><li><input type="checkbox"/> Relocate existing routes or segments that are causing, or have the potential to cause, adverse effects to soil, water quality, and riparian resources, to the extent practicable.<ul style="list-style-type: none"><li>○ Obliterate the existing road or segment after the relocated section is completed (see BMP Road-6 [Road Storage and Decommissioning]).</li></ul></li></ul> <p><b>Predesign</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Consider design criteria relative to soil, water quality, and riparian resources from the decision document and associated National Environmental Policy Act (NEPA) analysis document.</li><li><input type="checkbox"/> Consider the road RMOs and likely future maintenance schedule in the initial design.</li><li><input type="checkbox"/> Conduct suitable site investigations, data collection, and evaluations commensurate with the anticipated design and sensitivity of the area to soil, water quality, and riparian resource impacts.<ul style="list-style-type: none"><li>○ Consider subsurface conditions and conduct suitable investigations and stability analyses for road and ridge locations where slope instability can occur due to road construction.</li><li>○ Conduct a suitable soils and geotechnical evaluation to identify susceptibility to erosion and stable angles of repose.</li></ul></li></ul> <p><b>Design</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Design the road to fit the ground and terrain with the least practicable impacts to soil, water quality, and riparian resources considering the purpose and life of the road, safety, and cost.<ul style="list-style-type: none"><li>○ Use road standards that minimize impacts for grade and alignment (e.g., width, turning radius, and maximum slope).</li><li>○ Use low impact development treatments that reduce long-term maintenance needs wherever practicable.</li></ul></li><li><input type="checkbox"/> Design the road to maintain stable road prism, cut, and fill slopes.</li></ul>

	<ul style="list-style-type: none"> <li>○ Design cut and fill slope ratios to reduce soil loss from mass failures.</li> <li>○ Use structural or nonstructural measures as necessary to stabilize cut and fill slopes.</li> <li>□ Design the road surface drainage system to intercept, collect, and remove water from the road surface and surrounding slopes in a manner that minimizes concentrated flow in ditches, culverts, and over fill slopes and road surfaces <ul style="list-style-type: none"> <li>○ Use structural or nonstructural measures suitable to the road materials, road gradient, and expected traffic levels.</li> <li>○ Use an interval between drainage features that is suitable for the road gradient, surface material, and climate.</li> <li>○ Use suitable measures to avoid or minimize erosion of ditches.</li> </ul> </li> <li>□ Design the road subsurface drainage system to intercept, collect, and remove groundwater that may flow into the base course and subgrade, lower high-water tables, and drain water pockets. <ul style="list-style-type: none"> <li>○ Use suitable subsurface dispersion or collection measures to capture and disperse locally shallow groundwater flows intercepted by road cuts.</li> <li>○ Use suitable measures to release groundwater into suitable areas without causing erosion or siltation.</li> </ul> </li> <li>□ Design the road for minimal disruption of natural drainage patterns and to minimize the hydrologic connection of the road segment or network with nearby waterbodies. <ul style="list-style-type: none"> <li>○ Use suitable structural or nonstructural measures to avoid or minimize gully formation and erosion of fill slopes at outfalls of road surface drainage structures.</li> <li>○ Use suitable measures to avoid, to the extent practicable, or minimize direct discharges from road drainage structures to nearby waterbodies.</li> <li>○ Provide sufficient buffer distance at the outfalls of road surface drainage structures for water to infiltrate before reaching the waterbody.</li> <li>○ Use applicable practices of BMP Road-7 (Stream Crossings) to limit the number and length of water crossing connected areas to the extent practicable.</li> </ul> </li> <li>□ Design road surface treatment to support wheel loads, stabilize the roadbed, reduce dust, and control erosion consistent with anticipated traffic and use. <ul style="list-style-type: none"> <li>○ Consider whether road closures or roadway surface drainage and erosion protection can adequately mitigate adverse effects to soil, water quality, and riparian resources.</li> </ul> </li> <li>□ Design roads within the AMZ (when no practicable alternative exists outside of the AMZ to achieve access objectives) to maintain desired conditions, goals, and objectives for AMZ structure, function, and processes (See BMP Plan-3 [AMZ Planning]). <ul style="list-style-type: none"> <li>○ Use suitable measures to minimize or mitigate effects to waterbodies and other sensitive areas when adverse impacts cannot be practicably avoided.</li> </ul> </li> <li>□ Design waterbody crossings to avoid or minimize adverse effects to soil, water quality, and riparian resources to the extent practicable consistent with road use, legal requirements, and cost considerations (See BMP Road-7</li> </ul>
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	<p>[Stream Crossings]).</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Design a post-construction site vegetation plan, including short- and long-term objectives, using suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li></ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems.</li><li><input type="checkbox"/> Avoid blading ditches that are vegetated, functioning and effectively draining. Remove vegetation from swales, ditches, shoulders, and cut and fill slopes only when it impedes adequate drainage, vehicle passage, or obstructs necessary sight distance to avoid or minimize unnecessary or excessive vegetation disturbance.</li><li><input type="checkbox"/> Aggregate will be placed on access roads into water sources to reduce sedimentation to streams, as needed.</li><li><input type="checkbox"/> Relief culvert locations will be located, flagged, and approved by the Forest Service before installation to ensure that water is routed only onto stable soil/vegetation.</li><li><input type="checkbox"/> Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked.</li><li><input type="checkbox"/> No new temporary roads without previous ground disturbance will be constructed on slopes exceeding 35% slope.</li><li><input type="checkbox"/> No dust abatement chemicals will be applied within one foot of the outside edge of road ditch lines (See Chem-X).</li><li><input type="checkbox"/> Cease chemical dust abatement application within 25' of streams.</li><li><input type="checkbox"/> Application of dust abatement will not be applied when raining and will only be applied if there is a 3-day forecast of clear weather.</li><li><input type="checkbox"/> all opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 tons weed free straw per acre.. All temporary roads would remain closed to winter access, unless otherwise agreed to by the Forest Service.</li></ul>

Road-3. Road Construction and Reconstruction	
<b>Manual or Handbook Reference</b>	FSM 7720, FSH 7709.56, and FSH 7709.57
<b>Objective</b>	Avoid or minimize adverse effects to soil, water quality, and riparian resources from erosion, sediment, and other pollutant delivery during road construction or reconstruction.
<b>Practices</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for stormwater management and erosion control when constructing or reconstructing system roads.</li> <li><input type="checkbox"/> Use suitable construction techniques to create stable fills. <ul style="list-style-type: none"> <li>○ Use full bench construction techniques or retaining walls where stable fill construction is not possible.</li> <li>○ Avoid incorporating woody debris in the fill portion of the road prism.</li> <li>○ Leave existing rooted trees or shrubs at the toe of the fill slope to stabilize the fill.</li> <li>○ Avoid use of road fills for water impoundment dams unless specifically designed for that purpose.</li> </ul> </li> <li><input type="checkbox"/> Identify and locate waste areas before the start of operations. <ul style="list-style-type: none"> <li>○ Deposit and stabilize excess and unsuitable materials only in designated sites.</li> <li>○ Do not place such materials on slopes with a risk of excessive erosion, sediment delivery to waterbodies, mass failure, or within the AMZ.</li> <li>○ Provide adequate surface drainage and erosion protection at disposal sites.</li> </ul> </li> <li><input type="checkbox"/> Do not permit sidecasting within the AMZ. <ul style="list-style-type: none"> <li>○ Avoid or minimize excavated materials from entering waterbodies or AMZs.</li> </ul> </li> <li><input type="checkbox"/> Develop and follow blasting plans when necessary. <ul style="list-style-type: none"> <li>○ Use restrictive blasting techniques in sensitive areas and in sites that have high landslide potential.</li> <li>○ Avoid blasting when soils are saturated.</li> </ul> </li> <li><input type="checkbox"/> Remove slash and cull logs to designated sites outside the AMZ for storage or disposal. <ul style="list-style-type: none"> <li>○ Consider using cull logs in aquatic ecosystem projects to achieve aquatic resource management objectives as opportunities arise.</li> </ul> </li> <li><input type="checkbox"/> Use suitable measures in compliance with local direction to prevent and control invasive species.</li> <li><input type="checkbox"/> Construct pioneer roads using suitable measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. <ul style="list-style-type: none"> <li>○ Confine construction of pioneer roads to the planned roadway limits unless otherwise specified.</li> <li>○ Locate and construct pioneering roads to avoid or minimize undercutting of the designated final cut slope.</li> <li>○ Avoid deposition of materials outside the designated roadway limits.</li> <li>○ Use suitable crossing structures, or temporarily dewater live streams,</li> </ul> </li> </ul>

	<p>where pioneer roads intersect streams.</p> <ul style="list-style-type: none"> <li>○ Use suitable erosion and stormwater control measures as needed (see BMP Fac-2 [Facility Construction and Stormwater Control]).</li> </ul> <ul style="list-style-type: none"> <li><input type="checkbox"/> Reconstruct existing roads to the degree necessary to provide adequate drainage and safety.</li> <li><input type="checkbox"/> Avoid disturbing stable road surfaces.</li> <li><input type="checkbox"/> Use suitable measures to avoid, to the extent practicable, or minimize direct discharges from road drainage structures to nearby waterbodies.</li> </ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems. S</li> <li><input type="checkbox"/> Avoid blading ditches that are vegetated, functioning and effectively draining. Remove vegetation from swales, ditches, shoulders, and cut and fill slopes only when it impedes adequate drainage, vehicle passage, or obstructs necessary sight distance to avoid or minimize unnecessary or excessive vegetation disturbance.</li> <li><input type="checkbox"/> During construction and reconstruction activities, unsuitable or excess excavated soil material shall be placed in Forest Service approved waste sites. Spread and shape material to drain. Finish slopes on waste no steeper than 1V:1.5H. Utilize hydromulch or weedfree mulch and place uniformly on finished slopes. Relief culvert locations will be located, flagged, and approved by the Forest Service before installation to ensure that water is routed only onto stable soil/vegetation.</li> <li><input type="checkbox"/> Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked.</li> </ul>

Road-4. Road Operations and Maintenance	
<b>Manual or Handbook Reference</b>	FSM 7732 and FSH 7709.59, chapter 60.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling road use and operations and providing adequate and appropriate maintenance to minimize sediment production and other pollutants during the useful life of the road.
<b>Practices</b>	<p><i>Operations</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Designate season of use to avoid or restrict road use during periods when use would likely damage the roadway surface or road drainage features.</li> <li><input type="checkbox"/> Designate class of vehicle and type of uses suitable for the road width, location, waterbody crossings, and road surfaces to avoid or minimize adverse effects to soil, water quality, or riparian resources to the extent practicable.</li> </ul>

	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use suitable measures to communicate and enforce road use restrictions.</li> <li><input type="checkbox"/> Use suitable measures to avoid or minimize adverse effects to soil, water quality, or riparian resources when proposed operations involve use of roads by traffic and during periods for which the road was not designed. <ul style="list-style-type: none"> <li>○ Strengthen the road surface in areas where surfaces are vulnerable to movement such as corners and steep sections.</li> <li>○ Upgrade drainage structures to avoid, to the extent practicable, or minimize direct discharges into nearby waterbodies.</li> <li>○ Restrict use to low-ground-pressure vehicles or frozen ground conditions.</li> <li>○ Strengthen the road base if roads are tending to rut.</li> <li>○ Adjust maintenance to handle the traffic while minimizing excessive erosion and damage to the road surface.</li> </ul> </li> <li><input type="checkbox"/> Ensure that drainage features are fully functional on completion of seasonal operations. <ul style="list-style-type: none"> <li>○ Shape road surfaces to drain as designed.</li> <li>○ Construct or reconstruct drainage control structures as needed.</li> <li>○ Ensure that ditches and culverts are clean and functioning.</li> <li>○ Remove berms unless specifically designed for erosion control purposes.</li> </ul> </li> <li><input type="checkbox"/> Consider potential for water quality effects from road damage when granting permits for oversize or overweight loads.</li> <li><input type="checkbox"/> Use suitable road surface stabilization practices and dust abatement supplements on roads with high or heavy traffic use (See FSH 7709.56 and FSH 7709.59).</li> <li><input type="checkbox"/> Use applicable practices of Chemical Use Management Activities BMPs when chemicals are used in road operations.</li> </ul> <p><b>Inspection</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Periodically inspect system travel routes to evaluate condition and assist in setting maintenance and improvement priorities. <ul style="list-style-type: none"> <li>○ Give inspection priority to roads at high risk of failure to reduce risk of diversions and cascading failures.</li> </ul> </li> <li><input type="checkbox"/> Inspect drainage structures and road surfaces after major storm events and perform any necessary maintenance (see BMP Road-11 [Road Storm-Damage Surveys]). <ul style="list-style-type: none"> <li>○ Repair and temporarily stabilize road failures actively producing and transporting sediment as soon as practicable and safe to do so.</li> </ul> </li> <li><input type="checkbox"/> Inspect roads frequently during all operations. <ul style="list-style-type: none"> <li>○ Restrict use if road damage such as unacceptable surface displacement or rutting is occurring.</li> </ul> </li> </ul> <p><b>Maintenance Planning</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Develop and implement annual maintenance plans that prioritize road maintenance work for the forest or district. <ul style="list-style-type: none"> <li>○ Increase priority for road maintenance work on road sections where road damage is causing, or potentially would cause, adverse effects to soil, water quality, and riparian resources.</li> <li>○ Consider the risk and consequence of future failure at the site when prioritizing repair of road failures.</li> </ul> </li> <li><input type="checkbox"/> Develop and implement annual road maintenance plans for projects where contractors or permittees are responsible for maintenance activities.</li> </ul>
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	<ul style="list-style-type: none"> <li>○ Define responsibilities and maintenance timing in the plan.</li> </ul> <p><b>Maintenance Activities</b></p> <ul style="list-style-type: none"> <li>□ Maintain the road surface drainage system to intercept, collect, and remove water from the road surface and surrounding slopes in a manner that reduces concentrated flow in ditches, culverts, and over fill slopes and road surfaces.             <ul style="list-style-type: none"> <li>○ Clean ditches and catch basins only as needed to keep them functioning.</li> <li>○ Do not undercut the toe of the cut slope when cleaning ditches or catch basins.</li> <li>○ Use suitable measures to avoid, to the extent practicable, or minimize direct discharges from road drainage structures to nearby waterbodies.</li> </ul> </li> <li>□ Identify diversion potential on roads and prioritize for treatment.             <ul style="list-style-type: none"> <li>○ Minimize diversion potential through installation and maintenance of dips, drains, or other suitable measures.</li> </ul> </li> <li>□ Maintain road surface treatments to stabilize the roadbed, reduce dust, and control erosion consistent with anticipated traffic and use.</li> <li>□ Grade road surfaces only as necessary to meet the smoothness requirements of the assigned operational maintenance level and to provide adequate surface drainage.             <ul style="list-style-type: none"> <li>○ Do not undercut the toe of the cut slope when grading roads.</li> <li>○ Do not permit sidecasting of maintenance-generated debris within the AMZ to avoid or minimize excavated materials entering waterbodies or riparian areas.</li> <li>○ Avoid overwidening of roads due to repeated grading over time, especially where sidecast</li> <li>○ material would encroach on waterbodies.</li> <li>○ Use potential sidecast or other waste materials on the road surface where practicable.</li> <li>○ Dispose of unusable waste materials in designated disposal sites.</li> </ul> </li> <li>□ Remove vegetation from swales, ditches, and shoulders, and cut and fill slopes only when it impedes adequate drainage, vehicle passage, or obstructs necessary sight distance to avoid or minimize unnecessary or excessive vegetation disturbance.</li> <li>□ Maintain permanent stream crossings and associated fills and approaches to reduce the likelihood that water would be diverted onto the road or erode the fill if the structure becomes obstructed.</li> <li>□ Identify waterbody-crossing structures that lack sufficient capacity to pass expected flows, bedload, or debris, or that do not allow for desired aquatic organism passage, and prioritize for treatment.             <ul style="list-style-type: none"> <li>○ Use applicable practices of BMP Road-7 (Stream Crossings) to improve crossings.</li> </ul> </li> <li>□ Use applicable practices of BMP Road-6 (Road Storage and Decommissioning) for maintenance and management of Maintenance Level 1 roads.</li> <li>□ Ensure the necessary specifications concerning prehaul maintenance, maintenance during haul, and posthaul maintenance (putting the road back in storage) are in place when maintenance level 1 roads are opened for use on commercial resource management projects or other permitted activities.             <ul style="list-style-type: none"> <li>○ Require the commercial operator or responsible party to leave roads in a satisfactory condition when project is completed.</li> </ul> </li> </ul>
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<p><b>Local / Site Specific BMP</b></p>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Erosion control measures (e.g. silt fences, weed-free straw/straw bales, etc.) will be placed and maintained at sites that have potential to deliver sediment to the stream network during the wet season. If sediment delivery is noted, additional erosion control measures will be placed and maintained.</li> <li><input type="checkbox"/> All new temporary road construction will be done using outslope designs, with drain dips and grade sags as needed, so that no new ditchlines will be built.</li> <li><input type="checkbox"/> Road construction or reconstruction operations (including culvert replacements) will occur during minimal runoff periods and within the instream work window as prescribed by Oregon Department of Fish &amp; Wildlife and approved by NOAA Fisheries.</li> <li><input type="checkbox"/> Roadwork contractors will have spill prevention and recovery equipment on site during all road construction operations as agreed to by the Forest Service.</li> <li><input type="checkbox"/> Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems.</li> <li><input type="checkbox"/> Avoid blading ditches that are vegetated, functioning and effectively draining. Remove vegetation from swales, ditches, shoulders, and cut and fill slopes only when it impedes adequate drainage, vehicle passage, or obstructs necessary sight distance to avoid or minimize unnecessary or excessive vegetation disturbance.</li> <li><input type="checkbox"/> During construction and reconstruction activities, unsuitable or excess excavated soil material shall be placed in Forest Service approved waste sites. Spread and shape material to drain. Finish slopes on waste no steeper than 1V:1.5H. Utilize hydromulch or weed free mulch and place uniformly. Aggregate will be placed on access roads into water sources to reduce sedimentation to streams, as needed.</li> <li><input type="checkbox"/> Haul on native surfaced roads should not occur during the wet season. Surface rock placement may be done outside the normal operating season as weather and road conditions permit, but no surface rock can be added to extend the season of haul on any of the abandoned roads that are to be obliterated after use.</li> <li><input type="checkbox"/> Relief culvert locations will be located, flagged, and approved by the Forest Service before installation to ensure that water is routed only onto stable soil/vegetation.</li> <li><input type="checkbox"/> All exposed soils will have required erosion control treatments completed the same year they are constructed even if they are not completed to final acceptance specifications. If the same area requires further disturbance to complete the road construction, it will be treated for erosion control and re-vegetated as needed to insure surface soil protection.</li> <li><input type="checkbox"/> Construction activities that may expose new soil (including clearing, grubbing, excavating, and fill placement) will be limited to the normal operating season. However, construction activities may be suspended anytime during wet weather to protect water quality of affected streams. Construction sites will be treated for erosion control and re-vegetated as needed to ensure surface soil protection.</li> </ul>
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	<ul style="list-style-type: none"> <li><input type="checkbox"/> Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked.</li> <li><input type="checkbox"/> No chemical dust abatement will be applied within 25 feet of perennial streams or any other stream crossing in which water is flowing during chemical application.</li> <li><input type="checkbox"/> No dust abatement chemicals will be applied within one foot of the outside edge of road ditch lines.</li> <li><input type="checkbox"/> Application of dust abatement will occur when streams are at their seasonal baseflow. Dust abatement will not be applied when raining and will only be applied if there is a 3-day forecast of clear weather.</li> <li><input type="checkbox"/> , all opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 tons of mulch. All temporary roads would remain closed to winter access , unless otherwise agreed to by the Forest Service, Rock quarry benches, access roads and work areas should be sloped to drain and disperse surface water without ponding. Runoff should not flow directly into streams.</li> <li><input type="checkbox"/> Road work at perennial streams, to be done under the timber sale contract, will be completed during low flow conditions when the potential for delivery of construction-related sediment can be minimized. During construction, stream water will be diverted around the work site and back into the channel.</li> <li><input type="checkbox"/> Stream crossing culvert locations will be located, flagged, and approved by the Forest Service before installation.</li> </ul>
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Road-5. Temporary Roads	
<b>Manual or Handbook Reference</b>	None known.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of temporary roads.
<b>Practices</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use applicable practices of BMP Road-2 (Road Location and Design) to locate temporary roads.</li> <li><input type="checkbox"/> Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for stormwater management and erosion control when constructing temporary roads.</li> <li><input type="checkbox"/> Install sediment and stormwater controls before initiating surface-disturbing activities to the extent practicable.</li> <li><input type="checkbox"/> Schedule construction activities to avoid direct soil and water-disturbance during periods of the year when heavy precipitation and runoff are likely to occur.</li> <li><input type="checkbox"/> Routinely inspect temporary roads to verify that erosion and stormwater controls are implemented, functioning, and appropriately maintained.</li> <li><input type="checkbox"/> Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning.</li> </ul>

	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use suitable measures in compliance with local direction to prevent and control invasive species.</li> <li><input type="checkbox"/> Use temporary crossings suitable for the expected uses and timing of use (See BMP Road-7 [Stream Crossings]).</li> <li><input type="checkbox"/> Use applicable practices of BMP Road-6 (Road Storage and Decommissioning) to obliterate the temporary road and return the area to resource production after the access is no longer needed.</li> </ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> All new temporary road construction will be done using outslope designs, with drain dips and grade sags as needed, so that no new ditchlines will be built.</li> <li><input type="checkbox"/> Road construction or reconstruction operations (including culvert replacements) will occur during minimal runoff periods.</li> <li><input type="checkbox"/> All exposed soils will have required erosion control treatments completed the same year they are constructed even if they are not completed to final acceptance specifications. If the same area requires further disturbance to complete the road construction, it will be treated for erosion control and re-vegetated as needed to insure surface soil protection.</li> <li><input type="checkbox"/> The timber sale purchasers are required to obliterate temporary spur roads under the timber sale contract. This involves subsoiling the road as appropriate (See XX), seeding as needed, and pulling displaced soil and duff back over the road surface. Slash will be pulled over the top of the road to provide additional ground cover and bare soil protection. Obliteration of temporary roads (new or legacy) shall meet specifications of the Forest Service, for depth of treatment and use of effective ground cover on treatment area.</li> <li><input type="checkbox"/> No new temporary roads without previous ground disturbance will be constructed on slopes exceeding 35% slope.</li> <li><input type="checkbox"/> All opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 tons of weed free mulch per acre. All temporary roads would remain closed to winter access unless otherwise agreed to by the Forest Service. A watershed specialist shall review all temporary roads prior to treatment to initiate and finalize the treatment prescription; the effectiveness of the temporary road restoration prescription in preventing erosion and providing suitable plant habitat shall be monitored.</li> </ul>

Road-6. Road Storage and Decommissioning	
<b>Manual or Handbook Reference</b>	FSH 7709.59, chapter 60 and FSM 7734.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by storing closed roads not needed for at least 1 year (Intermittent

	Stored Service) and decommissioning unneeded roads in a hydrologically stable manner to eliminate hydrologic connectivity, restore natural flow patterns, and minimize soil erosion.
<b>Practices</b>	<p><b>All Activities</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Implement suitable measures to close and physically block the road entrance so that unauthorized motorized vehicles cannot access the road. <ul style="list-style-type: none"> <li>○ Remove the road from the Motor Vehicle Use Map (MVUM) to include the change in the annual forestwide order associated with the MVUM.</li> </ul> </li> <li><input type="checkbox"/> Establish effective ground cover on disturbed sites to avoid or minimize accelerated erosion and soil loss. <ul style="list-style-type: none"> <li>○ Use suitable species and establishment techniques to stabilize and revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li> </ul> </li> </ul> <p><b>Road Storage</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Evaluate all stream and waterbody crossings for potential for failure or diversion of flow if left without treatment. <ul style="list-style-type: none"> <li>○ Use suitable measures to reduce the risk of flow diversion onto the road surface.</li> <li>○ Consider leaving existing crossings in low-risk situations where the culvert is not undersized, does not present an undesired passage barrier to aquatic organisms, and is relatively stable.</li> <li>○ Remove culverts, fill material, and other structures that present an unacceptable risk of failure or diversion.</li> <li>○ Reshape the channel and streambanks at the crossing-site to pass expected flows without scouring or ponding, minimize potential for undercutting or slumping of streambanks, and maintain continuation of channel dimensions and longitudinal profile through the crossing site.</li> <li>○ Use suitable measures to avoid or minimize scour and downcutting.</li> </ul> </li> <li><input type="checkbox"/> Use suitable measures to ensure that the road surface drainage system will intercept, collect, and remove water from the road surface and surrounding slopes in a manner that reduces concentrated flow in ditches, culverts, and over fill slopes and road surfaces without frequent maintenance.</li> <li><input type="checkbox"/> Use suitable measures to stabilize unstable road segments, seeps, slumps, or cut or fill slopes where evidence of potential failure exists.</li> </ul> <p><b>Road Conversion to Trail</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Reclaim unneeded road width, cut, and fill slopes when converting a road for future use as a trail.</li> <li><input type="checkbox"/> Use suitable measures to stabilize reclaimed sections to avoid or minimize undesired access and to restore desired ecologic structures or functions.</li> <li><input type="checkbox"/> Use suitable measures to ensure that surface drainage will intercept, collect, and remove water from the trail surface and surrounding slopes in a manner that minimizes concentrated flow and erosion on the trail surfaces without frequent maintenance.</li> <li><input type="checkbox"/> Use applicable practices of BMP Road-7 (Stream Crossings) to provide waterbody crossings suitable to the expected trail uses.</li> </ul> <p><b>Road Decommissioning</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use existing roads identified for decommissioning as skid roads in timber sales or land stewardship projects before closing the road, where practicable,</li> </ul>

	<p>as the opportunity arises.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Evaluate risks to soil, water quality, and riparian resources and use the most practicable, cost-effective treatments to achieve long-term desired conditions and water quality management goals and objectives.</li> <li><input type="checkbox"/> Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for stormwater management and erosion control when obliterating system roads.</li> <li><input type="checkbox"/> Implement suitable measures to re-establish stable slope contours and surface and subsurface hydrologic pathways where necessary to the extent practicable to avoid or minimize adverse effects to soil, water quality, and riparian resources. <ul style="list-style-type: none"> <li>○ Remove drainage structures.</li> <li>○ Recontour and stabilize cut slopes and fill material.</li> <li>○ Reshape the channel and streambanks at crossing sites to pass expected flows without scouring or ponding, minimize potential for undercutting or slumping of streambanks, and maintain continuation of channel dimensions and longitudinal profile through the crossing site.</li> <li>○ Restore or replace streambed materials to a particle size distribution suitable for the site.</li> <li>○ Restore floodplain function.</li> </ul> </li> <li><input type="checkbox"/> Implement suitable measures to promote infiltration of runoff and intercepted flow and desired vegetation growth on the road prism and other compacted areas.</li> <li><input type="checkbox"/> Use suitable measures in compliance with local direction to prevent and control invasive species.</li> </ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Under the timber sale contract, native-surfaced system roads, and level 1 roads, will have water bars installed and will be closed with road barriers to prevent damage after commercial use is complete, as appropriate. Level 1 aggregate surfaced system roads to be closed following use will be barricaded and treated with water bars if needed to prevent drainage problems.</li> <li><input type="checkbox"/> Haul on native surfaced roads should not occur during the wet season. Surface rock placement may be done outside the normal operating season as weather and road conditions permit, but no surface rock can be added to extend the season of haul on any of the abandoned roads that are to be obliterated after use.</li> <li><input type="checkbox"/> All exposed soils will have required erosion control treatments completed the same year they are constructed even if they are not completed to final acceptance specifications. If the same area requires further disturbance to complete the road construction, it will be treated for erosion control and re-vegetated as needed to insure surface soil protection.</li> <li><input type="checkbox"/> Water bars sufficient to disperse water shall be designated by the Forest Service to prevent future traffic and disperse subsurface water on all Maintenance Level 1 system roads that are re-opened and subsequently blocked.</li> <li><input type="checkbox"/> The timber sale purchasers are required to obliterate temporary spur roads under the timber sale contract. This involves subsoiling the road as appropriate, seeding as needed, and pulling displaced soil and duff back over</li> </ul>

	<p>the road surface. Slash will be pulled over the top of the road to provide additional ground cover and bare soil protection. Obliteration of temporary roads (new or legacy) shall meet specifications of the Forest Service, for depth of treatment and use of effective ground cover on treatment area.</p> <p><input type="checkbox"/> All opened temporary roads within RHCAs that are not further needed for project implementation would be obliterated, and those still needed to complete project implementation would be winterized with all erosion control measures in place, and barricaded or blocked. Erosion control, at a minimum, would include water bars and ground cover equivalent to 1.5 of mulch per acre. All temporary roads would remain closed to winter access, unless otherwise agreed to by the Forest Service.</p>
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Road-7. Stream Crossings	
<b>Manual or Handbook Reference</b>	Manual or Handbook Reference: FSM 7722 and FSH 7709.56b.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing, reconstructing, or maintaining temporary and permanent waterbody crossings.
<b>Practices</b>	<p><b>All Crossings</b></p> <p><input type="checkbox"/> Plan and locate surface water crossings to limit the number and extent to those that are necessary to provide the level of access needed to meet resource management objectives as described in the RMOs.</p> <p><input type="checkbox"/> Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems) when working in or near waterbodies.</p> <p><input type="checkbox"/> Use crossing structures suitable for the site conditions and the RMOs.</p> <p><input type="checkbox"/> Design and locate crossings to minimize disturbance to the waterbody.</p> <p><input type="checkbox"/> Use suitable measures to locate, construct, and decommission or stabilize bypass roads to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.</p> <p><input type="checkbox"/> Use suitable surface drainage and roadway stabilization measures to disconnect the road from the waterbody to avoid or minimize water and sediment from being channeled into surface waters and to dissipate concentrated flows.</p> <p><input type="checkbox"/> Use suitable measures to avoid, minimize, or mitigate damage to the waterbody and banks when transporting materials across the waterbody or AMZ during construction activities.</p> <p><b>Stream Crossings</b></p> <p><input type="checkbox"/> Locate stream crossings where the channel is narrow, straight, and uniform, and has stable soils and relatively flat terrain to the extent practicable.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Select a site where erosion potential is low.</li> <li><input type="checkbox"/> Orient the stream crossing perpendicular to the channel to the extent practicable.</li> <li><input type="checkbox"/> Keep approaches to stream crossings to as gentle a slope as practicable.</li> <li><input type="checkbox"/> Consider natural channel adjustments and possible channel location changes over the design life of the structure.</li> </ul> <p><input type="checkbox"/> Design the crossing to pass a normal range of flows for the site.</p>

	<ul style="list-style-type: none"> <li>○ Design the crossing structure to have sufficient capacity to convey the design flow without appreciably altering streamflow characteristics.</li> <li>○ Install stream crossings to sustain bankfull dimensions of width, depth, and slope and maintain streambed and bank resiliency and continuity through the structure.</li> <li>□ Bridge, culvert, or otherwise design road fill to prevent restriction of flood flows. <ul style="list-style-type: none"> <li>○ Use site conditions and local requirements to determine design flood flows.</li> <li>○ Use suitable measures to protect fill from erosion and to avoid or minimize failure of the crossing at flood flows.</li> <li>○ Use suitable measures to provide floodplain connectivity to the extent practicable.</li> </ul> </li> <li>□ Use suitable measures to avoid or minimize scour and erosion of the channel, crossing structure, and foundation to maintain the stability of the channel and banks.</li> <li>□ Design and construct the stream crossing to maintain the desired migration or other movement of fish and other aquatic life inhabiting the waterbody. <ul style="list-style-type: none"> <li>○ Consider the use of bottomless arch culverts where appropriate to allow for natural channel migration and desired aquatic organism passage.</li> <li>○ Install or maintain fish migration barriers only where needed to protect endangered, threatened, sensitive, or unique native aquatic populations, and only where natural barriers do not exist.</li> <li>○ Use stream simulation techniques where practicable to aid in crossing design.</li> </ul> </li> <li>□ Bridges <ul style="list-style-type: none"> <li>○ Use an adequately long bridge span to avoid constricting the natural active flow channel and minimize constriction of any overflow channel.</li> <li>○ Place foundations onto nonscour-susceptible material (e.g., bedrock or coarse rock material) or below the expected maximum depth of scour.</li> <li>○ Set bridge abutments or footings into firm natural ground (e.g., not fill material or loose soil) when placed on natural slopes.</li> <li>○ Use suitable measures as needed in steep, deep drainages to retain approach fills or use a relatively long bridge span.</li> <li>○ Avoid placing abutments in the active stream channel to the extent practicable.</li> <li>○ Place in-channel abutments in a direction parallel to the streamflow where necessary.</li> <li>○ Use suitable measures to avoid or minimize, to the extent practicable, damage to the bridge and associated road from expected flood flows, floating debris, and bedload.</li> <li>○ Inspect the bridge at regular intervals and perform maintenance as needed to maintain the function of the structure.</li> </ul> </li> <li>□ Culverts <ul style="list-style-type: none"> <li>○ Align the culvert with the natural stream channel.</li> <li>○ Cover culvert with sufficient fill to avoid or minimize damage by</li> </ul> </li> </ul>
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	<p>traffic.</p> <ul style="list-style-type: none"> <li>○ Construct at or near natural elevation of the streambed to avoid or minimize potential flooding upstream of the crossing and erosion below the outlet.</li> <li>○ Install culverts long enough to extend beyond the toe of the fill slopes to minimize erosion.</li> <li>○ Use suitable measures to avoid or minimize water from seeping around the culvert.</li> <li>○ Use suitable measures to avoid or minimize culvert plugging from transported bedload</li> <li>○ and debris.</li> <li>○ Regularly inspect culverts and clean as necessary.</li> </ul> <p>□ Low-Water Crossings</p> <ul style="list-style-type: none"> <li>○ Consider low-water crossings on roads with low traffic volume and slow speeds, and where water depth is safe for vehicle travel.</li> <li>○ Consider low-water crossings to cross ephemeral streams, streams with relatively low baseflow and shallow water depth or streams with highly variable flows or in areas prone to landslides or debris flows.</li> <li>○ Locate low-water crossings where streambanks are low with gentle slopes and channels are not deeply incised.</li> <li>○ Select and design low-water crossing structures to maintain the function and bedload movement of the natural stream channel.</li> <li>○ Locate unimproved fords in stable reaches with a firm rock or gravel base that has sufficient load-bearing strength for the expected vehicle traffic.</li> <li>○ Construct the low-water crossing to conform to the site, channel shape, and original streambed elevation and to minimize flow restriction, site disturbance, and channel blockage to the extent practicable.</li> <li>○ Use suitable measures to stabilize or harden the streambed and approaches, including the entire bankfull width and sufficient freeboard, where necessary to support the design vehicle traffic.</li> <li>○ Use vented fords with high vent area ratio to maintain stream function and aquatic organism passage.</li> <li>○ Construct the roadway-driving surface with material suitable to resist expected shear stress or lateral forces of water flow at the site.</li> <li>○ Consider using temporary crossings on roads that provide short-term or intermittent access to avoid, minimize, or mitigate erosion, damage to streambed or channel, and flooding.</li> <li>○ Design and install temporary crossings suitable for the expected users, loads, and timing of use.</li> <li>○ Design and install temporary crossing structures to pass a design storm determined based on local site conditions and requirements.</li> <li>○ Install and remove temporary crossing structures in a timely manner as needed to provide access during use periods and minimize risk of washout.</li> <li>○ Use suitable measures to stabilize temporary crossings that must remain in place during high runoff seasons.</li> <li>○ Monitor temporary crossings regularly while installed to evaluate condition.</li> <li>○ Remove temporary crossings and restore the waterbody profile and</li> </ul>
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	<p>substrate when the need for the crossing no longer exists.</p> <p><b><i>Standing Water and Wetland Crossings</i></b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Disturb the least amount of area as practicable when crossing a standing waterbody.</li> <li><input type="checkbox"/> Provide for sufficient cross drainage to minimize changes to, and avoid restricting, natural surface and subsurface water flow of the wetland under the road to the extent practicable. <ul style="list-style-type: none"> <li>○ Locate and design roads or road drainage to avoid dewatering or polluting wetlands.</li> <li>○ Avoid or minimize actions that would significantly alter the natural drainage for flow patterns on lands immediately adjacent to wetlands.</li> </ul> </li> <li><input type="checkbox"/> Use suitable measures to increase soil-bearing capacity and reduce rutting from expected vehicle traffic.</li> <li><input type="checkbox"/> Construct fill roads only when necessary. <ul style="list-style-type: none"> <li>○ Construct fill roads parallel to water flow and to be as low to natural ground level as practicable.</li> <li>○ Construct roads with sufficient surface drainage for surface water flows.</li> </ul> </li> </ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Erosion control measures (e.g. silt fences, weed-free straw/straw bales, etc.) will be placed and maintained at sites that have potential to deliver sediment to the stream network during the wet season if haul is going to take place. If sediment delivery is noted, additional erosion control measures will be placed and maintained Or haul will cease until conditions dry.</li> <li><input type="checkbox"/> Application of dust abatement will occur when streams are at their seasonal baseflow. Dust abatement will not be applied when raining and will only be applied if there is a 3-day forecast of clear weather.</li> <li><input type="checkbox"/> Road work at perennial streams, to be done under the timber sale contract, will be completed during low flow conditions when the potential for delivery of construction-related sediment can be minimized. During construction, stream water will be diverted around the work site and back into the channel.</li> <li><input type="checkbox"/> Stream crossing culvert locations will be located, flagged, and approved by the Forest Service before installation.</li> </ul>

Road-8. Snow Removal and Storage	
<b>Manual or Handbook Reference</b>	FS-7700-41 and FSH 7709.59, chapter 24.11.
<b>Objective</b>	Avoid or minimize erosion, sedimentation, and chemical pollution that may result from snow removal and storage activities.
<b>Practices</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Develop a snow removal plan for roads plowed for recreation, administrative, or other access to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.</li> <li><input type="checkbox"/> Use existing standard contract language (C5.316# or similar) for snow removal during winter logging operations to avoid, minimize, or mitigate</li> </ul>

	<p>adverse effects to soil, water quality, and riparian resources.</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Limit use of approved deicing and traction control materials to areas where safety is critical (e.g., intersections, steep segments, and corners).<ul style="list-style-type: none"><li>○ Use site-specific characteristics such as road width and design, traffic concentration, and proximity to surface waters to determine suitable amount of de-icing material to apply.</li><li>○ Use effective plowing techniques to optimize chemical de-icer use.</li><li>○ Consider use of alternative materials to chemical de-icers, such as sand or gravel, in sensitive areas.</li><li>○ Use properly calibrated controllers to ensure material application rates are accurately regulated.</li><li>○ Limit spray distribution of chemical de-icers when near surface waters.</li><li>○ Design paved roads and parking lots to facilitate sand removal (e.g., curbs or paved ditches).</li></ul></li><li><input type="checkbox"/> Use suitable measures when storing de-icing materials to avoid or minimize mobility of the materials.<ul style="list-style-type: none"><li>○ Store de-icing materials on a flat, upland, impervious area of adequate size to accommodate material stockpiles and equipment movement.</li><li>○ Stockpile de-icing materials under cover and provide runoff collection, containment, and treatment, as necessary, to avoid or minimize offsite movement.</li></ul></li><li><input type="checkbox"/> Move snow in a manner that will avoid or minimize disturbance of or damage to road surfaces and drainage structures.<ul style="list-style-type: none"><li>○ Mark drainage structures to avoid damage during plowing.</li><li>○ Conduct frequent inspections to ensure road drainage is not adversely affecting soil or water resources.</li></ul></li><li><input type="checkbox"/> Control areas where snow removal equipment can operate to avoid or minimize damage to riparian areas, floodplains, and stream channels.</li><li><input type="checkbox"/> Install snow berms where such placement will preclude concentration of snowmelt runoff and will serve to dissipate melt water.<ul style="list-style-type: none"><li>○ Provide frequent drainage through snow berms to avoid concentration of snowmelt runoff on fillslopes and other erosive areas, to dissipate melt water, and to avoid or minimize sediment delivery to waterbodies.</li></ul></li><li><input type="checkbox"/> Store snow in clearly delineated pre-approved areas where snowmelt runoff will not cause erosion or deliver snow, road de-icers, or traction-enhancing materials directly into surface waters.<ul style="list-style-type: none"><li>○ Store or dispose of snow adjacent to or on pervious surfaces in upland areas away from waterbodies to the extent practicable.</li><li>○ Do not store or dispose of snow in riparian areas, wetlands, or streams unless no other practicable alternative exists.</li></ul></li><li><input type="checkbox"/> Manage discharge of meltwater to avoid or minimize runoff of pollutants into surface waterbodies or groundwater.<ul style="list-style-type: none"><li>○ Use suitable measures to filter and treat meltwater before reaching surface water or groundwater.</li><li>○ Use suitable measures to disperse meltwater to avoid creating concentrated overland flow.</li><li>○ Collect and properly dispose of onsite litter, debris, and sediment from meltwater settling areas.</li></ul></li></ul>
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	<input type="checkbox"/> Discontinue road use and snow removal when use would likely damage the roadway surface or road drainage features. <ul style="list-style-type: none"> <li>○ Modify snow removal procedures as necessary to meet water quality concerns.</li> </ul> <input type="checkbox"/> Replace lost road surface materials with similar quality material and repair structures damaged in snow removal operations as soon as practicable.
<b>Local / Site Specific BMP</b>	<input type="checkbox"/> No Additional BMPs

Road-9. Parking and Staging Areas	
<b>Manual or Handbook Reference</b>	FSM 7710, FSM 7720, and FSM 7730.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing and maintaining parking and staging areas.
<b>Practices</b>	<input type="checkbox"/> Design and locate parking and staging areas of appropriate size and configuration to accommodate expected vehicles and avoid or minimize adverse effects to adjacent soil, water quality, and riparian resources. <ul style="list-style-type: none"> <li>○ Consider the number and type of vehicles to determine parking or staging area size.</li> </ul> <input type="checkbox"/> Use applicable practices of BMP Fac-2 (Facility Construction and Stormwater Control) for stormwater management and erosion control when designing, constructing, reconstructing, or maintaining parking or staging areas. <input type="checkbox"/> Use suitable measures to harden and avoid or minimize damage to parking area surfaces that experience heavy use or are used during wet periods. <input type="checkbox"/> Use and maintain suitable measures to collect and contain oil and grease in larger parking lots with high use and where drainage discharges directly to streams. <input type="checkbox"/> Connect drainage system to existing stormwater conveyance systems where available and practicable. <input type="checkbox"/> Conduct maintenance activities commensurate with parking or staging area surfacing and drainage requirements as well as precipitation timing, intensity, and duration. <input type="checkbox"/> Limit the size and extent of temporary parking or staging areas <ul style="list-style-type: none"> <li>○ Take advantage of existing openings, sites away from waterbodies, and areas that are apt to be more easily restored to the extent practicable.</li> <li>○ Use temporary stormwater and erosion control measures as needed.</li> </ul> <input type="checkbox"/> Use applicable practices of BMP Fac-10 (Facility Site Reclamation) to rehabilitate temporary parking or staging areas as soon as practicable following use.

<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Parking and Staging areas should not be located within 300 ft of perennial streams, unless approved by the Forest Service.</li><li><input type="checkbox"/> Botany design features specific to parking and staging – lithosols, meadows and grasslands.</li></ul>
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Road-10. Equipment Refueling and Servicing	
<b>Manual or Handbook Reference</b>	FSM 2160 and FSH 7109.19, chapter 40.
<b>Objective</b>	Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during equipment refueling and servicing activities.
<b>Practices</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Plan for suitable equipment refueling and servicing sites during project design.<ul style="list-style-type: none"><li>○ Allow temporary refueling and servicing only at approved locations, located well away from the AMZ, groundwater recharge areas, and waterbodies.</li></ul></li><li><input type="checkbox"/> Develop or use existing fuel and chemical management plans (e.g., Spill Prevention Control and Countermeasures [SPCC], spill response plan, and emergency response plan) when developing the management prescription for refueling and servicing sites.</li><li><input type="checkbox"/> Locate, design, construct, and maintain petroleum and chemical delivery and storage facilities consistent with applicable local, State, and Federal regulations.</li><li><input type="checkbox"/> Use suitable measures around vehicle service, storage and refueling areas, chemical storage and use areas, and waste dumps to fully contain spills and avoid or minimize soil contamination and seepage to groundwater.</li><li><input type="checkbox"/> Provide training for all agency personnel handling fuels and chemicals in their proper use, handling, storage, and disposal.<ul style="list-style-type: none"><li>○ Ensure that contractors and permit holders provide documentation of proper training in handling hazardous materials.</li></ul></li><li><input type="checkbox"/> Use suitable measures to avoid spilling fuels, lubricants, cleaners, and other chemicals during handling and transporting.</li><li><input type="checkbox"/> Prohibit excess chemicals or wastes from being stored or accumulated in the project area.</li><li><input type="checkbox"/> Remove service residues, used oil, and other hazardous or undesirable materials from NFS land and properly dispose them as needed during and after completion of the project.</li><li><input type="checkbox"/> Clean up and dispose of spilled materials according to specified requirements in the appropriate guiding document.</li><li><input type="checkbox"/> Report spills and initiate suitable cleanup action in accordance with applicable State and Federal laws, rules, and regulations.<ul style="list-style-type: none"><li>○ Remove contaminated soil and other material from NFS lands and dispose of this material in a manner consistent with controlling regulations.</li></ul></li><li><input type="checkbox"/> Prepare and implement a certified SPCC Plan for each facility, including</li></ul>

	<p>mobile and portable facilities, as required by Federal regulations.</p> <p><input type="checkbox"/> Use applicable practices of BMP Fac-10 (Facility Site Reclamation) to reclaim equipment refueling and services site when the need for them ends.</p>
<b>Local / Site Specific BMP</b>	<p><input type="checkbox"/> Roadwork contractors will have spill prevention and recovery equipment on site during all road construction operations as agreed to by the Forest Service.</p> <p><input type="checkbox"/> Fuel shall not be stored or equipment refueled within 300 feet of any stream channel or surface water feature.</p>

Road-11. Road Storm-Damage Surveys	
<b>Manual or Handbook Reference</b>	FSM 7730 and FSM 2350.
<b>Objective</b>	Monitor road conditions following storm events to detect road failures; assess damage or potential damage to waterbodies, riparian resources, and watershed functions; determine the causes of the failures; and identify potential remedial actions at the damaged sites and preventative actions at similar sites.
<b>Practices</b>	<p><b><i>ERFO-Related Damage Surveys</i></b></p> <p><input type="checkbox"/> Complete a Damage Survey Report (DSR) at damaged sites potentially eligible for ERFO funds.</p> <p><input type="checkbox"/> Complete the Forest Service-developed supplemental form DSR+ in the field to more thoroughly describe, in categorical terms, the cause(s) and consequences of the damage.</p> <ul style="list-style-type: none"> <li>○ The DSR+ form and instructions may be found at <a href="http://www.stream.fs.fed.us/bmp/damagesurveys">http://www.stream.fs.fed.us/bmp/damagesurveys</a>.</li> </ul> <p><input type="checkbox"/> Record the following information from damage sites that have been documented on the DSR and DSR+ forms in appropriate corporate database(s), including geographic information systems:</p> <ul style="list-style-type: none"> <li>○ The geographic locations (points or road segments) where damage occurred.</li> <li>○ The date of occurrence (year and month, if available).</li> <li>○ The type of failure and its cause.</li> </ul> <p><b><i>Special Storm Damage Surveys</i></b></p> <p><input type="checkbox"/> Determine the need to do more comprehensive surveys and analysis of road damage after particularly large storm events.</p> <ul style="list-style-type: none"> <li>○ Survey all roads in the area, typically an entire watershed, ranger district, or national forest or grassland, affected by the storm or those roads that may be particularly susceptible to failure.</li> </ul> <p><b><i>All Damage Surveys</i></b></p> <p><input type="checkbox"/> Analyze results from EFRO surveys, routine damage reconnaissance, and special surveys for patterns of damage and causes.</p> <p><input type="checkbox"/> Use these patterns of road damage to formulate recommendations of practice changes to reduce the incidence of future damage. Consider practice changes such as—</p> <ul style="list-style-type: none"> <li>○ Locating or relocating roads to more stable terrain (see BMP Road-2 [Road Location and Design]);</li> <li>○ Disconnecting road surface drainage from crossings and channels</li> </ul>

	<p>(see BMP Road-3 [Road Construction and Reconstruction]);</p> <ul style="list-style-type: none"> <li>○ Using special protections in locations on unstable landforms or areas with high erosion potential (see BMP Road-3 [Road Construction and Reconstruction]);</li> <li>○ Increasing the capacity of stream-crossing structures to pass water, debris, and sediment to reduce the probabilities of failure (see BMP Road-7 [Stream Crossings]);</li> <li>○ Building or rebuilding stream crossings to eliminate or reduce diversion potential (see BMP Road-7 [Stream Crossings]);</li> <li>○ Building or rebuilding stream crossings to improve aquatic species passage (see BMP Road-7 [Stream Crossings]); or</li> <li>○ Decommissioning or storing roads in a hydrologically benign condition (see BMP Road-6 [Road Storage and Decommissioning]).</li> </ul> <p><input type="checkbox"/> Enter and store the results of data analysis in corporate data management systems to facilitate sharing among units that have similar terrain and road practices.</p>
<b>Local / Site Specific BMP</b>	<p><input type="checkbox"/> No Additional BMPs</p>

## Facilities and Nonrecreation Special Uses Management

- **Fac-2. Facility Construction and Stormwater Control**

Fac-2. Facility Construction and Stormwater Control	
<b>Manual or Handbook Reference</b>	None known.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling erosion and managing stormwater discharge originating from ground disturbance during construction of developed sites
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Obtain Clean Water Act (CWA) 402 stormwater discharge permit coverage from the appropriate State agency or the U.S. Environmental Protection Agency (EPA) when more than 1 acre of land will be disturbed through construction activities.</li> <li><input type="checkbox"/> Obtain CWA 404 permit coverage from the U.S. Army Corps of Engineers when dredge or fill material will be discharged to waters of the United States.</li> <li><input type="checkbox"/> Establish designated areas for equipment staging, stockpiling materials, and parking to minimize the area of ground disturbance (see BMP Road-</li> </ul>

	<p>9 [Parking Sites and Staging Areas] and BMP Road-10 [Equipment Refueling and Servicing]).</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Establish and maintain construction area limits to the minimum area necessary for completing the project and confine disturbance to within this area.</li> <li><input type="checkbox"/> Develop and implement an erosion control and sediment plan that covers all disturbed areas, including borrow, stockpile, fueling, and staging areas used during construction activities.</li> <li><input type="checkbox"/> Calculate the expected runoff generated using a suitable design storm to determine necessary stormwater drainage capacity. <ul style="list-style-type: none"> <li>o Use site conditions and local requirements to determine design storm.</li> <li>o Include run-on from any contributing areas.</li> </ul> </li> <li><input type="checkbox"/> Refer to State or local construction and stormwater BMP manuals, guidebooks, and trade publications for effective techniques to: <ul style="list-style-type: none"> <li>o Apply soil protective cover on disturbed areas where natural revegetation is inadequate to prevent accelerated erosion during construction or before the next growing season.</li> <li>o Maintain the natural drainage pattern of the area wherever practicable.</li> <li>o Control, collect, detain, treat, and disperse stormwater runoff from the site.</li> <li>o Divert surface runoff around bare areas with appropriate energy dissipation and sediment filters.</li> <li>o Stabilize steep excavated slopes.</li> </ul> </li> <li><input type="checkbox"/> Develop and implement a postconstruction site vegetation plan using suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per Forest Service Manual (FSM) 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li> <li><input type="checkbox"/> Install sediment and stormwater controls before initiating surface-disturbing activities to the extent practicable.</li> <li><input type="checkbox"/> Do not use snow or frozen soil material in facility construction.</li> <li><input type="checkbox"/> Schedule, to the extent practicable, construction activities to avoid direct soil and water disturbance during periods of the year when heavy precipitation and runoff are likely to occur. <ul style="list-style-type: none"> <li>o Limit the amount of exposed or disturbed soil at any one time to the minimum necessary to complete construction operations.</li> <li>o Limit operation of equipment when ground conditions could result in excessive rutting, soil puddling, or runoff of sediments directly into waterbodies.</li> </ul> </li> <li><input type="checkbox"/> Install suitable stormwater and erosion control measures to stabilize disturbed areas and waterways before seasonal shutdown of project operations or when severe or successive storms are expected.</li> <li><input type="checkbox"/> Use low-impact development practices where practicable.</li> <li><input type="checkbox"/> Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning. <ul style="list-style-type: none"> <li>o Prepare for unexpected failures of erosion control measures.</li> <li>o Implement corrective actions without delay when failures are discovered to prevent pollutant discharge to nearby waterbodies.</li> </ul> </li> <li><input type="checkbox"/> Routinely inspect construction sites to verify that erosion and stormwater</li> </ul>
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	controls are implemented and functioning as designed and are appropriately maintained. <input type="checkbox"/> Use suitable measures in compliance with local direction to prevent and control invasive species.
<b>Local / Site Specific BMP</b>	<input type="checkbox"/>

## Wildland Fire Management Activities

- **Fire-1 Wildland Fire Management Planning**
- **Fire-2 Use of Prescribed Fire**

Fire-1 Wildland Fire Management Planning	
<b>Manual or Handbook Reference</b>	FSM 5120; FSM 5150; FSH 5109.19 Ch. 50
<b>Objective</b>	Use the fire management planning process to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during wildland fire management activities.
<b>Practices</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Consider the beneficial and adverse effects of wildland fire on water quality and watershed condition when developing desired conditions and goals for the plan area.<ul style="list-style-type: none"><li>○ Identify areas where the adverse effects of unplanned wildland fire to water quality and watershed condition outweigh the benefits.</li></ul></li><li><input type="checkbox"/> Include plan objectives and strategies that allow the use of wildland fire where suitable to restore watershed conditions.</li><li><input type="checkbox"/> Include design criteria, standards, and guidelines for fire management activities to avoid or minimize adverse effects to soil, water quality, and riparian resources.</li><li><input type="checkbox"/> Consider the need to establish a network of permanent water sources in the plan area for fire control and suppression.</li><li><input type="checkbox"/> Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone [AMZ] Planning) when planning prescribed fire treatments.</li><li><input type="checkbox"/> Consider prescription elements and ecosystem objectives at the appropriate watershed scale to determine the optimum and maximum burn unit size, total burn area, burn intensity, disturbance thresholds for local downstream water resources, area or length of water resources to be affected, and contingency strategies.<ul style="list-style-type: none"><li>○ Consider the extent, severity, and recovery of fire disturbance a watershed has experienced in the past to evaluate cumulative effects and re-entry intervals.</li></ul></li><li><input type="checkbox"/> Identify environmental conditions favorable for achieving desired condition or treatment objectives of the site while minimizing detrimental mechanical and heat disturbance to soil and water considering the following factors.<ul style="list-style-type: none"><li>○ Existing and desired conditions for vegetation and fuel type, composition, structure, distribution, and density.</li><li>○ Short- and long-term site objectives.</li></ul></li></ul>

	<ul style="list-style-type: none"> <li>○ Acceptable fire weather parameters.</li> <li>○ Desirable soil, duff, and fuel moisture levels.</li> <li>○ Existing duff and humus depths.</li> <li>○ Site factors such as slope and soil conditions.</li> <li>○ Expected fire behavior and burn severity based on past burn experience in vegetation types in the project area.</li> <li>○ Extent and condition of roads, fuel breaks, and other resource activities and values.</li> </ul> <ul style="list-style-type: none"> <li><input type="checkbox"/> Develop burn objectives that avoid or minimize creating water-repellent soil conditions to the extent practicable considering fuel load, fuel and soil moisture levels, fire residence times, and burn intensity. <ul style="list-style-type: none"> <li>○ Use low-intensity prescribed fire on steep slopes or highly erodible soils when prescribed fire is the only practicable means to achieve project objectives in these areas.</li> </ul> </li> <li><input type="checkbox"/> Set target levels for desired ground cover remaining after burning based on slope, soil type, and risk of soil and hillslope movement.</li> <li><input type="checkbox"/> Plan burn areas to use natural or in-place barriers that reduce or limit fire spread, such as roads, canals, utility rights-of-way, barren or low fuel hazard areas, streams, lakes, or wetland features, where practicable, to minimize the need for fireline construction. <ul style="list-style-type: none"> <li>○ Identify the type, width, and location of firebreaks or firelines in the prescribed fire plan.</li> </ul> </li> <li><input type="checkbox"/> Use fire initiation techniques, control methods, and access locations for ignition and control (holding versus escape conditions) that minimize potential effects to soil, water quality, and riparian resources.</li> <li><input type="checkbox"/> Use prescribed fire in the AMZ only when suitable to achieve long-term AMZ-desired conditions and management objectives (see BMP Plan-3 [AMZ Planning]).</li> </ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Air quality would be emphasized during prescribed fire planning. Mitigating measures would be considered including extending the burning season to spread emissions throughout the year. All burning would be planned and conducted to comply with applicable air quality laws and regulations and coordinated with appropriate air quality regulatory agencies.</li> <li><input type="checkbox"/> Equipment used to machine pile slash would use legacy skid trails, and temporary and permanent roads on slopes less than 35%, as much as possible.</li> <li><input type="checkbox"/> Burning would be carried out when fuel moistures are sufficient to help retain existing snags and down wood to the extent feasible.</li> <li><input type="checkbox"/> Maximum depth of slash on temporary roads and landings is 12 inches.</li> <li><input type="checkbox"/> Grapple piles would be constructed to the following specifications: All slash from 1 inch in diameter up to 6 inches in diameter and exceeding 3 feet in length shall be piled. Piles would be constructed compactly with minimal soil in the piles and covered to shed water so they remain dry for burning during the fall or winter; height would be at least 6 feet and no greater than 12 feet; width would be at least 6 feet and no greater than 10 feet. Piles would be evenly spaced between trees and snags left after harvest. Piles would be placed on temporary roads or designated equipment trails when possible. Piles would be placed at least 50 feet away</li> </ul>

	<p>from live streams.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Machine piles at landings will be built by grapple or shovel to keep dirt and rock debris out. No cat piling or pushing of piles.</li> <li><input type="checkbox"/> Where the volume of landing and roadside slash exceeds the ability to create piles and meet pile size and location specifications above, slash would be returned to temporary roads and designated forwarding corridors for piling or dispersal after subsoiling, if needed.</li> <li><input type="checkbox"/> Slash pile construction and burning in and around riparian areas should be consistent with Blue Mountain PDCs.</li> </ul>
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Fire-2 Use of Prescribed Fire	
<b>Manual or Handbook Reference</b>	FSM 5140
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects of prescribed fire and associated activities on soil, water quality, and riparian resources that may result from excessive soil disturbance as well as inputs of ash, sediment, nutrients, and debris.
<b>Practices</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Conduct the prescribed fire in such a manner as to achieve the burn objectives outlined in the Prescribed Fire Plan (see BMP Fire-1 [Wildland Fire Management Planning]).</li> <li><input type="checkbox"/> Locate access and staging areas near the project site but outside of AMZs, wetlands, and sensitive soil areas. <ul style="list-style-type: none"> <li><input type="checkbox"/> Keep staging areas as small as possible while allowing for safe and efficient operations.</li> <li><input type="checkbox"/> Store fuel for ignition devices in areas away from surface water bodies and wetlands.</li> <li><input type="checkbox"/> Install suitable measures to minimize and control concentrated water flow and sediment from staging areas.</li> <li><input type="checkbox"/> Collect and properly dispose of trash and other solid waste.</li> <li><input type="checkbox"/> Restore and stabilize staging areas after use (see BMP Veg-6 [Landings]).</li> </ul> </li> <li><input type="checkbox"/> Conduct prescribed fires to minimize the residence time on the soil while meeting the burn objectives. <ul style="list-style-type: none"> <li><input type="checkbox"/> Manage fire intensity to maintain target levels of soil temperature and duff and residual vegetative cover within the limits and at locations described in the prescribed fire plan.</li> </ul> </li> <li><input type="checkbox"/> Construct fireline to the minimum size and standard necessary to contain the prescribed fire and meet overall project objectives. <ul style="list-style-type: none"> <li><input type="checkbox"/> Locate and construct fireline in a manner that minimizes erosion and runoff from directly entering waterbodies by considering site slope and soil conditions, and using and maintaining suitable water and erosion control measures.</li> <li><input type="checkbox"/> Consider alternatives to ground-disturbing fireline construction such as using wet lines, rock outcrops, or other suitable features for firelines.</li> <li><input type="checkbox"/> Establish permanent fireline with suitable water and erosion control</li> </ul> </li> </ul>

	<p>measures in areas where prescribed fire treatments are used on a recurring basis.</p> <ul style="list-style-type: none"> <li>○ Maintain firebreaks in a manner that minimizes exposed soil to the extent practicable.</li> <li>○ Rehabilitate or otherwise stabilize fireline in areas that pose a risk to water quality.</li> </ul> <p><input type="checkbox"/> Alter prescribed fire prescriptions and control actions in the AMZs as needed to maintain ecosystem structure, function, and processes and onsite and downstream water quality.</p> <ul style="list-style-type: none"> <li>○ Pretreat AMZs and drainage ways to reduce excessive fuel loadings.</li> <li>○ Avoid building firelines in or around riparian areas, wetlands, marshes, bogs, fens, or other sensitive water-dependent sites unless needed to protect life, property, or wetlands.</li> <li>○ Construct any essential fireline in the AMZ in a manner that minimizes the amount of area and soil disturbed.</li> <li>○ Keep high-intensity fire out of the AMZ unless suitable measures are used to avoid or minimize adverse effects to water quality.</li> <li>○ Avoid or minimize complete removal of the organic layer when burning in riparian areas or wetlands to maintain soil productivity, infiltration capacity, and nutrient retention.</li> <li>○ Rehabilitate fireline in the AMZ after prescribed fire treatment is completed.</li> <li>○ Remove debris added to stream channels as a result of the prescribed burning unless debris is prescribed to improve fisheries habitat.</li> </ul> <p><input type="checkbox"/> Conduct prescribed fire treatments, including pile burning, for slash disposal in a manner that encourages efficient burning to minimize soil impacts while achieving treatment objectives.</p> <ul style="list-style-type: none"> <li>○ Pile and burn only the slash that is necessary to be disposed of to achieve treatment objectives.</li> <li>○ Locate slash piles in areas where the potential for soil effects is lessened (meadows, rock outcrops, etc.) and that do not interfere with natural drainage patterns.</li> <li>○ Remove wood products such as firewood or fence posts before piling and burning to reduce the amount of slash to be burned.</li> <li>○ Minimize the amount of dirt or other noncombustible material in slash piles to promote efficient burning.</li> <li>○ Construct piles in such a manner as to promote efficient burning.</li> <li>○ Avoid burning large stumps and sections of logs in slash piles to reduce the amount of time that the pile burns.</li> <li>○ Avoid burning when conditions will cause the fire to burn too hot and damage soil conditions.</li> <li>○ Avoid piling and burning for slash removal in AMZs to the extent practicable.</li> <li>○ Minimize effects on soil, water quality, and riparian resources by appropriately planning pile size, fuel piece size limits, spacing, and burn prescriptions in compliance with State or local laws and regulations if no practical alternatives for slash disposal in the AMZ are available.</li> </ul> <p><input type="checkbox"/> Evaluate the completed burn to identify sites that may need stabilization treatments or monitoring to minimize soil and site productivity loss and</p>
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	<p>deterioration of water quality both on and off the site.</p> <ul style="list-style-type: none"><li>○ Provide for rapid revegetation of all denuded areas through natural processes supplemented by artificial revegetation where necessary.</li><li>○ Use suitable measures to promote water retention and infiltration or to augment soil cover where necessary.</li><li>○ Use suitable species and establishment techniques to stabilize the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li><li>○ Clear streams and ditches of debris introduced by fire control equipment during the prescribed fire operation.</li><li>○ Consider long-term management of the site and nearby areas to promote project success.</li><li>○ Use suitable measures to limit human, vehicle, and livestock access to site as needed to allow for recovery of vegetation.</li></ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> Burn plans would include water quality burn plans would include design that would mitigate adverse effects to water quality.</li><li><input type="checkbox"/> Burn plans for each prescribed fire will be prepared in advance of ignition, reviewed by a hydrologist, fisheries biologist, botanist, cultural resource specialist, wildlife biologist, range specialist, recreation/lands specialist and silviculturist and approved by the appropriate line officer.</li><li><input type="checkbox"/> As needed, fire lines would require water bars at slopes greater than 30%. Fire line water bars would deflect surface run-off from the trail down slope onto stable material such as rock surface cover. Fire line construction would generally avoid sensitive areas like unique habitats.</li><li><input type="checkbox"/> Burning would be carried out when fuel moistures are sufficient to help retain existing snags and down wood to the extent prescribed burns are designed to maintain and enhance desired forest structure, tree densities, snag densities, and CWD levels.</li><li><input type="checkbox"/> Burning would be conducted to meet air quality standards as outlined by Oregon DEQ, and air quality monitoring would be conducted in conjunction with the DEQ.</li><li><input type="checkbox"/> Prescribed fire and mechanical hand treatments will follow the established Blue Mountain PDCs</li></ul>

## Minerals Management Activities

- **Min-1. Minerals Planning**
- **Min-5. Mineral Materials Resource Sites**

Min-1. Minerals Planning	
<b>Manual or Handbook Reference</b>	FSM 2810, FSM 2820, FSM 2830, and FSM 2850.
<b>Objective</b>	Use the minerals planning process to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during minerals exploration, production, operations, and reclamation activities.
<b>Practices</b>	Develop site-specific BMP prescriptions for the following practices, as

	<p>appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <p><b>All Activities</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone [AMZ] Planning) when planning minerals activities.</li> <li><input type="checkbox"/> Identify potential environmental risks of the proposed minerals activities and include measures in project plans to manage risk by removing or eliminating the source of risk, changing the mining plan, or removing the resource at risk from harm's way.</li> <li><input type="checkbox"/> Inform proponent that a Clean Water Act (CWA) 402 permit may be required if the minerals operation causes a point source or stormwater discharge of any pollutant to waters of the United States.</li> <li><input type="checkbox"/> Inform proponent that a CWA 404 permit may be required if the mining operations will result in a discharge of dredge or fill material to waters of the United States.</li> <li><input type="checkbox"/> Evaluate plan of operations to ensure that reasonable measures, including appropriate BMPs are included to avoid and minimize adverse effects to soil, water quality, and riparian resources from the mining activities. <ul style="list-style-type: none"> <li>○ Require suitable geotechnical or stability analyses to ensure that facilities are constructed to acceptable factors of safety using standard engineering practices and considering foundation conditions and material; construction materials and techniques; the seismicity of the area; and the water-related resources at risk.</li> <li>○ Require suitable characterization of ore, waste rock, and tailings using accepted protocols to identify materials that have the potential to release acidity or other contaminants when exposed during mining.</li> <li>○ Require suitable characterization of mine site hydrology commensurate with the potential for impacts to surface water and groundwater resources, to include physical and chemical characteristics of surface and groundwater systems, as needed, for the range of expected seasonal variation in precipitation and potential stormflow events likely to occur at the site for the duration of the minerals activities.</li> <li>○ Stipulate suitable requirements, including water treatment as needed, to avoid or minimize the development and release of acidic or other contaminants.</li> <li>○ Use applicable practices from the Minerals Management Activities BMPs.</li> <li>○ Evaluate the consumptive use of water in the mining operation and its effect on waterdependent ecosystems.</li> <li>○ Evaluate the potential for direct and indirect impacts to morphology, stability, and function of waterbodies, riparian areas, and wetland habitats.</li> <li>○ Identify suitable measures to avoid impacts to waterbodies, riparian areas, and wetland habitats through appropriate location, design, operation, and reclamation requirements.</li> <li>○ Identify suitable interim and post-project surface water and groundwater monitoring where needed to confirm predictions of</li> </ul> </li> </ul>
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	<p>impacts, detect adverse changes at the earliest practicable time, and develop appropriate changes in operations or recommend closure where needed.</p> <ul style="list-style-type: none"><li>○ Request a copy of operator's CWA 401 Certification from designated Federal, State, or local entity before approving a plan of operations that may result in any discharge into waters of the United States.</li></ul> <p>□ As outlined in the Forest Service Training Guide for Reclamation Bond Estimation and Administration for Minerals Plans of Operation, consider the direct and indirect costs of stabilizing, rehabilitating, and reclaiming the area of mineral operations to the appropriate standards for water quality and watershed condition as determined from the land management plan, State and Federal laws, regulations, plans, or permits when determining the reclamation bond amount. Include costs for:</p> <ul style="list-style-type: none"><li>○ Operation and maintenance of facilities designed to divert, convey, store, or treat water.</li><li>○ Decontaminating, neutralizing, disposing, treating, or isolating hazardous materials at the site to minimize potential for contamination of soil, surface water, and ground water.</li><li>○ Water treatment needs predicted during planning and discovered during operations to achieve applicable water quality standards.</li><li>○ Earthwork to reclaim roads; waste rock dumps; tailings; backfilling water features (diversions, ditches, and sediment ponds); and construction of diversion channels and drains, stream channels, and wetlands.</li><li>○ Revegetation to stabilize the site and minimize soil erosion.</li><li>○ Mitigation to restore natural function and value of streams, wetlands, and floodplains.</li><li>○ Long-term operations, monitoring, and maintenance of mineral production-related facilities that must perform as designed to avoid or minimize contamination of surface or groundwater resources, including roads, diversion ditches, dams, and water treatment systems.</li><li>○ Protection of the reclaimed area until long-term stability, erosion control, and revegetation has been established.</li></ul> <p><b>Locatable Minerals</b></p> <ul style="list-style-type: none"><li>□ Evaluate Notice of Intent to Operate proposal to determine if it will likely cause significant disturbance to soil, water quality, and riparian resources.<ul style="list-style-type: none"><li>○ Require a plan of operation from the mineral operator, lessee, or purchaser as required by law and regulation if proposed activities might cause significant disturbance of surface resources including soil, water quality, or riparian resources.</li></ul></li></ul> <p><b>Minerals Leasing</b></p> <ul style="list-style-type: none"><li>□ Include in the land management plan, or other area wide decision document, direction for surface occupancy. Use lease stipulations to avoid riparian areas, wetlands, and areas subject to mass soil movement; to avoid or minimize erosion and sediment production; and to avoid or minimize adverse effects to water quality and municipal supply watersheds, if these issues are not adequately addressed by provisions in regulations at 36 CFR 228.108.</li><li>□ Use the applicable practices from the Minerals Activities BMPs for recommendations on post-lease approval of operations.</li></ul>
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	<ul style="list-style-type: none"> <li><input type="checkbox"/> Require or work with BLM to require appropriate contingency plans to avoid or minimize adverse impacts to surface waters.</li> <li><input type="checkbox"/> Coordinate with BLM to ensure the reclamation bond required for operations will be sufficient to guarantee reclamation work on NFS lands to the appropriate standards for water quality and watershed condition as determined from the land management plan, State and Federal laws, regulations, plans, or permits.</li> </ul> <p><b>Mineral Materials</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Include reasonable conditions and applicable practices of BMP Min-3 (Minerals Production) and BMP Min-5 (Mineral Materials Resource Sites) in the operating plan to ensure proper protection of soil, water quality, and riparian resources and timely reclamation of disturbed areas.</li> <li><input type="checkbox"/> Consider the direct and indirect costs of stabilizing, rehabilitating, and reclaiming the area of mineral materials operations to the appropriate standards for water quality and watershed condition as determined from the land management plan, State and Federal laws, regulations, plans, or permits when determining the reclamation bond amount.</li> </ul> <p><b>Mineral Reservations and Outstanding Mineral Rights</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Evaluate the Operating Plan for Mineral Reservation Operations to ensure that reasonable measures, including appropriate BMPs, consistent with the terms of the deed, are included to minimize damage to NFS surface resources that could affect soil, water quality, and riparian resources and that provide for restoration and reclamation of disturbed lands.</li> <li><input type="checkbox"/> Evaluate the Operating Plan for Outstanding Mineral Rights to ensure that reasonable measures, including appropriate BMPs, are included to control erosion, avoid or minimize water pollution, and reclaim the site consistent with land management plan direction for water quality management.</li> </ul>
<b>Local / Site Specific BMP</b>	<input type="checkbox"/> No Additional BMPs

Min-5. Mineral Materials Resource Sites	
<b>Manual or Handbook Reference</b>	FSM 2850.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when developing and using upland mineral materials resource sites or instream sand and gravel deposits.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <p><b>All Activities</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Allow upland and instream sand and gravel mining where consistent with land management plan desired conditions, goals, and objectives for soils, aquatic and riparian habitats, and water quality.</li> <li><input type="checkbox"/> Use applicable practices of BMP Min-3 (Minerals Production) and BMP Fac-</li> </ul>

	<p>2 (Facility Construction and Stormwater Control) for sanitation, solid waste, and transport and storage of petroleum products or other hazardous materials and to control erosion, manage stormwater, keep the site dry, and protect the waterbody when clearing the extraction and processing areas.</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Use applicable practices of BMP Min-6 (Ore Stockpiles, Mine Waste Storage and Disposal, Reserve Pits, and Settling Ponds) and BMP Min-7 (Produced Water) to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when processing materials.</li></ul> <p><b>Upland Gravel Pits</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Plan operations at the site in advance to minimize disturbance area and more effectively and efficiently open and operate the site.<ul style="list-style-type: none"><li>○ Limit the area of the facility to the minimum necessary for efficient operations while providing sufficient area for materials processing and stockpiling.</li><li>○ Phase development where practicable.</li><li>○ Use suitable measures to avoid, mitigate, or treat metal leaching and formation of acid rock drainage.</li></ul></li><li><input type="checkbox"/> Conduct extraction activities in such a manner as to minimize the potential for slope failures, limit slope steepness and length, limit disturbed areas to those actively used for extraction, retain existing vegetation as long as possible, and allow for progressive reclamation of the site where practicable.</li></ul> <p><b>Instream Sand and Gravel Mining</b></p> <ul style="list-style-type: none"><li><input type="checkbox"/> Use applicable practices of BMP AqEco-2 (Operations in Aquatic Ecosystems), BMP AqEco-3 (Ponds and Wetlands), and BMP AqEco-4 (Stream Channels and Shorelines) when working in or near waterbodies to prevent or minimize adverse impacts to water quality.</li><li><input type="checkbox"/> Consider channel type and effects of the proposed operation on channel morphology and function when approving instream sand and gravel mining operations.</li><li><input type="checkbox"/> Limit access disturbance to designated areas on one streambank to reduce the effort required for site reclamation.<ul style="list-style-type: none"><li>○ Use suitable measures to protect the streambank at access points to minimize bank erosion.</li></ul></li><li><input type="checkbox"/> Locate the material processing and stockpile site at a suitable distance from the active channel to leave a buffer zone along the waterbody to reduce risk of flooding.<ul style="list-style-type: none"><li>○ Consider historic channel migration patterns and site elevation when locating mineral processing and stockpile sites.</li><li>○ Avoid or minimize disturbance to valuable riparian areas; wetlands; and aquatic-dependent threatened, endangered, and sensitive species habitat.</li></ul></li><li><input type="checkbox"/> Include suitable measures to protect channel morphology and function when extracting sand and gravel deposits.<ul style="list-style-type: none"><li>○ Specify the maximum depth of mining.</li><li>○ Limit extraction depth to minimize slope changes along the stream, avoid or minimize channel and bank erosion, and retain existing natural channel armoring.</li><li>○ Limit extraction amount to minimize upstream and downstream effects due to changes in bedload transport.</li><li>○ Avoid modifying point bars to the extent where the resultant channel changes cause unacceptable reduced sinuosity or increased stream</li></ul></li></ul>
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	<ul style="list-style-type: none"> <li>gradient, velocity, stream power, and bank instability.</li> <li>○ Schedule in-channel mining to occur during low-flow periods.</li> <li>○ Avoid or minimize changes to channel shape and reduce effects of mining on aquatic habitats by establishing a low-flow buffer.</li> <li>○ Avoid or minimize streambank erosion and instability during and after mining.</li> <li>○ Avoid or minimize headward erosion of the channel at the upstream end of the instream pit.</li> </ul> <p><input type="checkbox"/> Design and construct diversion channels to handle anticipated flow volumes and to minimize upstream and downstream effects of changes in stream grade, width, depth, bed characteristics, bank instability, and groundwater inflows when temporarily or permanently dewatering stream channels to extract sand and gravel.</p> <ul style="list-style-type: none"> <li>○ Ensure barrier is able to adequately protect the dewatered mining area from flood flows.</li> </ul> <p><input type="checkbox"/> Conduct excavation operations in such a manner as to avoid significant increases in downstream turbidity.</p>
<b>Local / Site Specific BMP</b>	<input type="checkbox"/> No Additional BMPs

## Mechanical Vegetation Management Activities

- ☐ **Veg-1 Vegetation Management Planning**
- ☐ **Veg-2 Erosion Prevention and Control**
- ☐ **Veg-3 Aquatic Management Zones**
- ☐ **Veg-4 Ground-Based Skidding and Yarding Operations**
- ☐ **Veg-5 Cable and Aerial Yarding Operations**
- ☐ **Veg-6 Landings**
- ☐ **Veg-7 Winter Logging**
- ☐ **Veg-8 Mechanical Site Treatment**

Veg-1 Vegetation Management Planning	
<b>Manual or Handbook Reference</b>	FSM 1921.12
<b>Objective</b>	Use the applicable vegetation management planning processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during mechanical vegetation treatment activities.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use applicable practices of BMP Plan-2 (Project Planning and Analysis) and BMP Plan-3 (Aquatic Management Zone (AMZ) Planning) when planning vegetation management projects. <ul style="list-style-type: none"> <li>○ Evaluate opportunities to use proposed mechanical vegetation treatment projects to achieve AMZ desired conditions, goals, and</li> </ul> </li> </ul>

	<p>objectives in the project area.</p> <ul style="list-style-type: none"><li>□ Evaluate and field verify site conditions in the project area to design mechanical vegetation treatment prescriptions that avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.<ul style="list-style-type: none"><li>○ Validate land management plan timber suitability decisions for the project area.</li><li>○ Design mechanical vegetation treatment prescriptions to limit site disturbance, soil exposure, and displacement to acceptable levels as determined from the land management plan desired conditions, standards, and guidelines or other local direction or requirements.</li><li>○ Evaluate direct, indirect, and cumulative effects of vegetation alteration on streamflow regimes and consequent channel responses at suitable watershed scales.</li><li>○ Use local direction or requirements for slope, erosion potential, mass wasting potential, and other soil or site properties to determine areas suitable for ground-based, cable, and aerial yarding systems (see BMP Veg-4 [Ground-Based Skidding and Yarding Operations] and BMP Veg-5 [Cable and Aerial Yarding Operations]).</li><li>○ Use the most economically practicable yarding system that will minimize road densities.</li><li>○ Consider site preparation and fuel treatment needs and options.</li><li>○ Use applicable practices of BMP Veg-8 (Mechanical Site Treatment) to determine areas suitable for mechanical treatments for site preparation, fuels treatment, habitat improvements, or other vegetation management purposes.</li><li>○ Evaluate the capabilities of the machinery likely to operate in the landscape under consideration.</li><li>○ Use preplanning to schedule entry or timing of mechanical and other vegetation treatments (e.g., prescribed fire or chemical treatments) when needed for large projects.</li></ul></li><li>□ Evaluate and field verify site conditions in the project area to design a transportation plan associated with the mechanical vegetation treatments to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources.<ul style="list-style-type: none"><li>○ Use the logging system that best fits the topography, soil types, and season, while minimizing soil disturbance and road densities and that economically achieves silvicultural objectives.</li><li>○ Use applicable practices of BMP Road-2 (Road Location and Design), BMP Veg-4 (Ground-Based Skidding and Yarding Operations), BMP Veg-5 (Cable and Aerial Yarding Operations), and BMP Veg-6 (Landings) to determine proposed location and size of roads, landings, skid trails, and cable corridors.</li><li>○ Use applicable practices of BMP Road-1 (Travel Management Planning and Analysis) and BMP Road-5 (Temporary Roads) to determine the need for specified roads and temporary roads.</li><li>○ Evaluate the condition of system roads, including roads in storage, and unauthorized roads in the project area to determine their suitability for use in the project and any reconstruction or prehaul maintenance needs.</li><li>○ Evaluate the Road Management Objective of system roads to determine where log hauling should be prohibited or restricted.</li></ul></li></ul>
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	<input type="checkbox"/> Identify sources of rock for roadwork, riprapping, and borrow materials (see BMP Min-6 [Mineral Materials Resource Sites]). <input type="checkbox"/> Identify water sources available for purchasers' use (see BMP WatUses-3 [Administrative Water Developments]). <input type="checkbox"/> Ensure the timber sale contract, stewardship contract, or other implementing document includes BMPs from the decision document to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. <ul style="list-style-type: none"> <li>○ Use appropriate standard B and C provisions and regional or local provisions to address measures and responsibilities consistent with the BMPs in the decision document in the timber sale or stewardship contract.</li> <li>○ Delineate all protected or excluded areas, including AMZs and waterbodies, on the sale area map or project map.</li> <li>○ Delineate approved water locations, staging areas, and borrow areas on the sale area map or project map.</li> <li>○ Ensure that the final unit location, layout, acreage, and logging system or mechanical treatment and Knutson-Vandenberg Act plans are consistent with the decision document.</li> </ul> <input type="checkbox"/> Use contract modification procedures to the extent practicable to modify unit design, treatment methods, or other project activities where necessary to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources based on new information or changed conditions discovered during project implementation.
<b>Local / Site Specific BMP</b>	<input type="checkbox"/>

Veg-2 Erosion Prevention and Control	
<b>Manual or Handbook Reference</b>	Forest Service Handbook (FSH) 2409.15.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.
<b>Practices</b>	Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment. <ul style="list-style-type: none"> <li><input type="checkbox"/> Establish designated areas for equipment staging and parking to minimize the area of ground disturbance (see BMP Road-9 [Parking Sites and Staging Areas]).</li> <li><input type="checkbox"/> Use provisions in the timber sale contract or land stewardship contract to implement and enforce erosion control on the project area.             <ul style="list-style-type: none"> <li>○ Work with the contractor to locate landings, skid trails, and slash</li> </ul> </li> </ul>

	<p>piles in suitable sites to avoid, minimize, or mitigate potential for erosion and sediment delivery to nearby waterbodies.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Develop an erosion control and sediment plan that covers all disturbed areas including skid trails and roads, landings, cable corridors, temporary road fills, water source sites, borrow sites, or other areas disturbed during mechanical vegetation treatments.</li> <li><input type="checkbox"/> Refer to State or local forestry or silviculture BMP manuals, guidebooks, and trade publications for effective structural and nonstructural measures to—</li> <li><input type="checkbox"/> q Apply soil protective cover on disturbed areas where natural revegetation is inadequate to prevent accelerated erosion before the next growing season. <ul style="list-style-type: none"> <li>o Maintain the natural drainage pattern of the area wherever practicable.</li> <li>o Control, collect, detain, treat, and disperse stormwater runoff from disturbed areas.</li> <li>o Divert surface runoff around bare areas with appropriate energy dissipation and sediment filters.</li> <li>o Stabilize steep excavated slopes.</li> </ul> </li> <li><input type="checkbox"/> Use suitable species and establishment techniques to cover or revegetate disturbed areas in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li> <li><input type="checkbox"/> Use suitable measures in compliance with local direction to prevent and control invasive species.</li> <li><input type="checkbox"/> Install sediment and stormwater controls before initiating surface-disturbing activities to the extent practicable.</li> <li><input type="checkbox"/> Operate equipment when soil compaction, displacement, erosion, and sediment runoff would be minimized. <ul style="list-style-type: none"> <li>o Avoid ground equipment operations on unstable, wet, or easily compacted soils and on steep slopes unless operation can be conducted without causing excessive rutting, soil puddling, or runoff of sediments directly into waterbodies.</li> <li>o Evaluate site conditions frequently to assess changing conditions.</li> <li>o Adjust equipment operations as necessary to protect the site while maintaining efficient project operations.</li> </ul> </li> <li><input type="checkbox"/> Install suitable stormwater and erosion control measures to stabilize disturbed areas and waterways on incomplete projects before seasonal shutdown of operations or when severe storm or cumulative precipitation events that could result in sediment mobilization to waterbodies are expected.</li> <li><input type="checkbox"/> Routinely inspect disturbed areas to verify that erosion and stormwater controls are implemented and functioning as designed and are suitably maintained.</li> <li><input type="checkbox"/> Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning. <ul style="list-style-type: none"> <li>o Prepare for unexpected failures of erosion control measures.</li> </ul> </li> <li><input type="checkbox"/> Implement mechanical treatments on the contour of sloping ground to avoid or minimize water concentration and subsequent accelerated erosion.</li> </ul>
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<b>Local / Site Specific BMP</b>	<input type="checkbox"/> No Additional BMPs
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Veg-3 Aquatic Management Zones	
<b>Manual or Handbook Reference</b>	Forest Service Manual (FSM) 2526, 2527
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities in the AMZ.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use applicable practices of BMP Plan-3 (AMZ Planning) to determine the need for and width of the AMZ considering the proposed mechanical vegetation treatments. <ul style="list-style-type: none"> <li>○ Modify AMZ width as needed to provide assurance of leave-tree wind firmness where high windthrow risk is identified.</li> </ul> </li> <li><input type="checkbox"/> Clearly delineate AMZ locations and boundaries in the project area using suitable markings and structures. <ul style="list-style-type: none"> <li>○ Maintain or reestablish these boundaries as necessary during project implementation or operation.</li> <li>○ Specify AMZ layout, maintenance, and operating requirements in contracts, design plans, and other necessary project documentation.</li> </ul> </li> <li><input type="checkbox"/> Use mechanical vegetation treatments in the AMZ only when suitable to achieve long-term AMZ-desired conditions and management objectives (see BMP Plan-3 [AMZ Planning]).</li> <li><input type="checkbox"/> Modify mechanical vegetation treatment prescriptions and operations in the AMZs as needed to maintain ecosystem structure, function, and processes.</li> <li><input type="checkbox"/> Design silvicultural or other vegetation management prescriptions to maintain or improve the riparian ecosystem and adjacent waterbody.</li> <li><input type="checkbox"/> Use yarding systems or mechanical treatments that avoid or minimize disturbance to the ground and vegetation consistent with project objectives. <ul style="list-style-type: none"> <li>○ Conduct equipment operations in a manner that maintains or provides sufficient ground cover to meet land management plan desired conditions, goals, and objectives to minimize erosion and trap sediment.</li> <li>○ Use suitable measures to avoid or minimize soil disturbance from equipment operations to stay within acceptable disturbance levels when conducting mechanical vegetation treatment operations.</li> <li>○ Prescribe mechanical site preparation techniques and fuels and residual vegetation treatments that avoid or minimize excessive erosion, sediment delivery to nearby waterbodies, or damage to desired riparian vegetation.</li> <li>○ Conduct operations in a manner that avoids or minimizes introduction</li> </ul> </li> </ul>

	<p>of excess slash or other vegetative debris into the AMZ and waterbodies; damage to streambanks, shorelines, and edges of wetlands; and adverse effects to floodplain functioning.</p> <ul style="list-style-type: none"> <li>○ Retain trees as necessary for canopy cover and shading, bank stabilization, and as a source of large woody debris within the AMZ.</li> <li>○ Avoid felling trees into streams or waterbodies, except as planned to create habitat features.</li> </ul> <p><input type="checkbox"/> Locate transportation facilities for mechanical vegetation treatments, including roads, landings, and main skid trails, outside of the AMZ to the extent practicable.</p> <ul style="list-style-type: none"> <li>○ Minimize the number of stream crossings to the extent practicable.</li> <li>○ Evaluate options for routes that must cross waterbodies and choose the one (e.g., specified road vs. temporary road vs. skid road or trail) that avoids or minimizes adverse effects to soil, water quality, and riparian resources to the greatest extent practicable.</li> <li>○ Do not use drainage bottoms as turn-around areas for equipment during mechanical vegetation treatments.</li> </ul> <p><input type="checkbox"/> Use suitable measures to disperse concentrated flows of water from road surface drainage features to avoid or minimize surface erosion, gully formation, and mass failure in the AMZ and sediment transport to the waterbody.</p> <p><input type="checkbox"/> Monitor the AMZ during mechanical operations to evaluate compliance with prescription and mitigation requirements in the authorizing document.</p> <ul style="list-style-type: none"> <li>○ Adjust operations in the AMZ to avoid, minimize, or mitigate detrimental soil impacts where they are occurring.</li> <li>○ Use suitable mitigation or restoration measures on areas in the AMZ that show signs of unacceptable erosion or those with high potential for erosion due to mechanical operations in the AMZ.</li> <li>○ Remove unauthorized debris from waterbodies using techniques that will limit disturbance to bed and banks, riparian areas, aquatic-dependent species, and the waterbody unless significant damage would occur during its removal or leaving it in meets desired conditions for the waterbody.</li> </ul>
<b>Local / Site Specific BMP</b>	<p><input type="checkbox"/> Road work at perennial streams, to be done under the timber sale contract, will be completed during low flow conditions prior to XX of any calendar year when the potential for delivery of construction-related sediment can be minimized. Stream water will be diverted out of the channel during construction.</p> <p><input type="checkbox"/> The stream crossing replacements in perennial streams, to be done under a separate contract after the timber sale, will be completed during low flow conditions when the potential for delivery of construction-related sediment can be minimized. Stream water will be diverted out of the channel during construction to minimize turbidity.</p> <p><input type="checkbox"/> Equipment should not operate in any no cut buffers unless expressly analyzed through the NEPA analysis or consultation with local resource specialists.</p> <p><input type="checkbox"/> Burning within the riparian zone to reduce fuel hazard near stream channels will be carefully controlled to minimize fire intensity and will be in accordance to the established Blue Mountain PDCs.</p>

	<input type="checkbox"/> Implement PACFISH Buffers <input type="checkbox"/> Where treatment in Category 4 streams is approved a 25 ft no harvest buffer will be delineated on the ground by the silviculturist, the fish biologist or hydrologist.
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Veg-4. Ground-Based Skidding and Yarding Operations	
<b>Manual or Handbook Reference</b>	FSH 2409.15
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during ground-based skidding and yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use ground-based yarding systems only where physical site characteristics are suitable to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. <ul style="list-style-type: none"> <li>○ Use local direction or requirements for slope, erosion potential, mass wasting potential, and other soil or site properties to determine areas suitable for ground-based yarding systems.</li> </ul> </li> <li><input type="checkbox"/> Use existing roads and skid trail networks to the extent practicable. <ul style="list-style-type: none"> <li>○ Create new roads and skid trail where re-use of existing ones would exacerbate soil, water quality, and riparian resource impacts.</li> </ul> </li> <li><input type="checkbox"/> Design and locate skid trails and skidding operations to minimize soil disturbance to the extent practicable. <ul style="list-style-type: none"> <li>○ Designate skid trails to the extent practicable to limit site disturbance.</li> <li>○ Locate skid trails outside of the AMZ to the extent practicable.</li> <li>○ Locate skid trails to avoid concentrating runoff and provide breaks in grade.</li> <li>○ Limit the grade of constructed skid trails on geologically unstable, saturated, highly erodible, or easily compacted soils.</li> <li>○ Avoid long runs on steep slopes.</li> </ul> </li> <li><input type="checkbox"/> Use suitable measures during felling and skidding operations to avoid or minimize disturbance to soils and waterbodies to the extent practicable. <ul style="list-style-type: none"> <li>○ Perform skidding or yarding operations when soil conditions are such that soil compaction, displacement, and erosion would be minimized.</li> <li>○ Suspend skidding or yarding operations when soil moisture levels could result in unacceptable soil damage.</li> <li>○ Avoid skidding logs in or adjacent to a stream channel or other waterbody to the extent practicable.</li> <li>○ Skid across streams only at designated locations.</li> <li>○ Use suitable measures at skid trail crossings to avoid or minimize</li> </ul> </li> </ul>

	<p>damage to the stream channel and streambanks.</p> <ul style="list-style-type: none"> <li>○ Directionally fell trees to facilitate efficient removal along predetermined yarding patterns with the least number of passes and least amount of disturbed area (e.g., felling-to-the-lead).</li> <li>○ Directionally fell trees away from streambanks, shorelines, and other waterbody edges.</li> <li>○ Remove logs from wet meadows or AMZs using suitable techniques to minimize equipment operations in the sensitive area and minimize dragging the logs on the ground.</li> <li>○ Winch or skid logs upslope, away from waterbodies.</li> <li>○ Use low ground pressure equipment when practicable, particularly on equipment traveling over large portions of units with sensitive soils or site conditions.</li> </ul> <p><input type="checkbox"/> Use applicable practices of BMP Veg-2 (Erosion Prevention and Control) to minimize and control erosion to the extent practicable.</p> <p><input type="checkbox"/> Use suitable measures to stabilize and restore skid trails after use.</p> <ul style="list-style-type: none"> <li>○ Reshape the surface to promote dispersed drainage.</li> <li>○ Install suitable drainage features.</li> <li>○ Mitigate soil compaction to improve infiltration and revegetation conditions.</li> <li>○ Apply soil protective cover on disturbed areas where natural revegetation is inadequate to prevent accelerated erosion before the next growing season.</li> <li>○ Use suitable measures to promote rapid revegetation.</li> <li>○ Use suitable measures in compliance with local direction to prevent and control invasive species.</li> </ul>
<b>Local / Site Specific BMP</b>	<p><input type="checkbox"/> No Additional BMPs</p>

Veg-5. Cable and Aerial Yarding Operations	
<b>Manual or Handbook Reference</b>	FSH 2409.15.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during cable and aerial yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use cable or aerial yarding systems on steep slopes where ground-based equipment cannot operate without causing unacceptable ground disturbance. <ul style="list-style-type: none"> <li>○ Use local direction or requirements for slope, erosion potential, mass wasting potential, and other soil or site properties to</li> </ul> </li> </ul>

	<p>determine areas suitable for cable or aerial yarding systems.</p> <ul style="list-style-type: none"> <li>○ Consider slope shape, potential barriers, lift and deflection requirements, and availability of suitable landing locations when selecting cable-yarding systems.</li> </ul> <ul style="list-style-type: none"> <li><input type="checkbox"/> Identify areas requiring cable or aerial yarding during project planning and in the contract.</li> <li><input type="checkbox"/> Identify necessary equipment capabilities in the contract.</li> <li><input type="checkbox"/> Locate cable corridors to efficiently yard materials with the least soil damage. <ul style="list-style-type: none"> <li>○ Use suitable measures to minimize soil disturbance when yarding over breaks in slope.</li> </ul> </li> <li><input type="checkbox"/> Fully suspend logs to the extent practicable when yarding over AMZs and streams.</li> <li><input type="checkbox"/> Postpone yarding operations when soil moisture levels are high if the specific type of yarding system results in unacceptable soil disturbance and erosion within cable corridors.</li> <li><input type="checkbox"/> Use applicable practices of BMP Veg-2 (Erosion Prevention and Control) to minimize and control erosion in cable corridors to the extent practicable.</li> </ul>
<b>Local / Site Specific BMP</b>	<input type="checkbox"/> No Additional BMPs

Veg-6. Landings	
<b>Manual or Handbook Reference</b>	FSH 2409.15.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of log landings.
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Minimize the size and number of landings as practicable to accommodate safe, economical, and efficient operations.</li> <li><input type="checkbox"/> Locate landings to limit the potential for pollutant delivery to waterbodies. <ul style="list-style-type: none"> <li>○ Locate landings outside the AMZ and as far from waterbodies as reasonably practicable based on travel routes and environmental considerations.</li> <li>○ Avoid locating landings near any type of likely flow or sediment transport conduit during storms, such as ephemeral channels and swales, where practicable.</li> <li>○ Locate landings to minimize the number of required skid roads.</li> <li>○ Avoid locating landings on steep slopes or highly erodible soils.</li> <li>○ Avoid placing landings where skidding across drainage bottoms is required.</li> </ul> </li> <li><input type="checkbox"/> Design roads and trail approaches to minimize overland flow entering the</li> </ul>

	<p>landing.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Re-use existing landings where their location is compatible with management objectives and water quality protection.</li> <li><input type="checkbox"/> Use applicable practices of BMP Veg-2 (Erosion Prevention and Control) to minimize and control erosion as needed during construction and use of log landings. <ul style="list-style-type: none"> <li><input type="checkbox"/> Install and maintain suitable temporary erosion control and stabilization measures when the landing will be reused within the same year.</li> </ul> </li> <li><input type="checkbox"/> Use applicable practices of BMP Fac-6 (Hazardous Materials) and BMP Road-10 (Equipment Refueling and Servicing) when managing fuels, chemicals, or other hazardous materials on the landing.</li> <li><input type="checkbox"/> Use suitable measures as needed to restore and stabilize landings after use. <ul style="list-style-type: none"> <li><input type="checkbox"/> Remove all logging machinery refuse (e.g., tires, chains, chokers, cable, and miscellaneous discarded parts) and contaminated soil to a proper disposal site.</li> <li><input type="checkbox"/> Reshape the surface to promote dispersed drainage.</li> <li><input type="checkbox"/> Install suitable drainage features.</li> <li><input type="checkbox"/> Mitigate soil compaction to improve infiltration and revegetation conditions.</li> <li><input type="checkbox"/> Apply soil protective cover on disturbed areas where natural revegetation is inadequate to prevent accelerated erosion before the next growing season. <ul style="list-style-type: none"> <li><input type="checkbox"/> Use suitable measures to promote rapid revegetation.</li> <li><input type="checkbox"/> Use suitable species and establishment techniques to cover or revegetate disturbed areas in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li> </ul> </li> </ul> </li> </ul>
<b>Local / Site Specific BMP</b>	<input type="checkbox"/> No Additional BMPs

	<b>Veg -7 Winter Logging</b>
<b>Manual or Handbook Reference</b>	FSH 2409.15.
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from winter logging activities.
<b>Practices</b>	<ul style="list-style-type: none"> <li><input type="checkbox"/> Consider using snow-roads and winter harvesting in areas with high-water tables, sensitive riparian conditions, or other potentially significant soil erosion and compaction hazards. <ul style="list-style-type: none"> <li><input type="checkbox"/> Use snow roads for single-entry harvests or temporary roads.</li> </ul> </li> <li><input type="checkbox"/> Mark existing culvert locations before plowing, hauling, or yarding operations begin to avoid or minimize damage from plowing or logging machinery.</li> <li><input type="checkbox"/> Ensure all culverts and ditches are open and functional during and after logging operations.</li> <li><input type="checkbox"/> Plow any snow cover off roadways to facilitate deep-freezing of the road</li> </ul>

	<p>grade before hauling.</p> <ul style="list-style-type: none"> <li>○ Manage hauling to avoid or minimize unacceptable damage to the road surface.</li> </ul> <p><input type="checkbox"/> Use suitable measures to cross streams (see BMP Road-7 [Stream Crossings]).</p> <ul style="list-style-type: none"> <li>○ Restore crossings to near preroad conditions to avoid or minimize ice dams when use of the snow-road is no longer needed.</li> </ul> <p><input type="checkbox"/> Conduct winter logging operations when the ground is frozen or snow cover and depth is adequate to avoid or minimize unacceptable rutting or displacement of soil.</p> <p><input type="checkbox"/> Suspend winter operations if ground and snow conditions change such that unacceptable soil disturbance, compaction, displacement, or erosion becomes likely.</p> <p><input type="checkbox"/> Compact the snow on skid trail locations when adequate snow depths exist before felling or skidding trees.</p> <p><input type="checkbox"/> Avoid locating skid trails on steep areas where frozen skid trails may be subject to soil erosion the next spring.</p> <p><input type="checkbox"/> Mark AMZ boundaries and stream courses before the first snow in a manner that will be clearly visible in heavy snows.</p> <p><input type="checkbox"/> Avoid leaving slash in streams or AMZs to the extent practicable.</p> <p><input type="checkbox"/> Install and maintain suitable erosion control on skid trails before spring runoff (see BMP Veg-2 [Erosion Prevention and Control]).</p> <ul style="list-style-type: none"> <li>○ Install erosion control measures during the dry season if needed.</li> </ul>
<b>Local / Site Specific BMP</b>	<input type="checkbox"/> No Additional BMPs
<b>Veg-8. Mechanical Site Treatment</b>	
<b>Manual or Handbook Reference</b>	None known,
<b>Objective</b>	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling the introduction of sediment, nutrients, chemical, or other pollutants to waterbodies during mechanical site treatment
<b>Practices</b>	<p>Develop site-specific BMP prescriptions for the following practices, as appropriate or when required, using State BMPs, Forest Service regional guidance, land management plan direction, BMP monitoring information, and professional judgment.</p> <p><input type="checkbox"/> Evaluate multiple site factors, including soil conditions, slope, topography, and weather, to prescribe the most suitable mechanical treatment and equipment to avoid or minimize unacceptable impacts to soil while achieving treatment objectives.</p> <ul style="list-style-type: none"> <li>○ Consider the condition of the material and the site resulting from the treatment in comparison to desired conditions, goals, and objectives for the site when analyzing treatment options (e.g., a mastication treatment will result in a very different condition than a grapple pile and burn treatment).</li> </ul>

	<ul style="list-style-type: none"><li>○ Use land management plan direction, or other local guidance, to establish residual ground cover requirements and soil disturbance limits suitable to the site to minimize erosion.</li><li>○ Consider offsite use options for the biomass material to reduce onsite treatment and disposal.</li></ul> <ul style="list-style-type: none"><li><input type="checkbox"/> Use applicable practices of BMP Veg-3 (Aquatic Management Zones) when conducting mechanical treatments in the AMZ.</li><li><input type="checkbox"/> Use applicable practices of BMP Veg-2 (Erosion Prevention and Control) to minimize and control erosion.<ul style="list-style-type: none"><li>○ Conduct mechanical activities when soil conditions are such that unacceptable soil disturbance, compaction, displacement, and erosion would be avoided or minimized.</li><li>○ Consider using low ground-pressure equipment, booms, or similar equipment to minimize soil disturbance.</li></ul></li><li><input type="checkbox"/> Operate mechanical equipment so that furrows and soil indentations are aligned on the contour.</li><li><input type="checkbox"/> Scarify the soil only to the extent necessary to meet reforestation objectives.<ul style="list-style-type: none"><li>○ Use site-preparation equipment that produces irregular surfaces.</li><li>○ Avoid or minimize damage to surface soil horizons to the extent practicable.</li></ul></li><li><input type="checkbox"/> Conduct machine piling of slash in such a manner to leave topsoil in place and to avoid displacing soil into piles.</li><li><input type="checkbox"/> Re-establish vegetation as quickly as possible.<ul style="list-style-type: none"><li>○ Evaluate the need for active and natural revegetation of exposed and disturbed sites.</li><li>○ Use suitable species and establishment techniques to revegetate the site in compliance with local direction and requirements per FSM 2070 and FSM 2080 for vegetation ecology and prevention and control of invasive species.</li></ul></li></ul>
<b>Local / Site Specific BMP</b>	<ul style="list-style-type: none"><li><input type="checkbox"/> No Additional BMPs</li></ul>